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A STUDY OF NURSES' SOURCES AND LEVELS OF STRESS

by

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BEVERLEY JOAN MOIR

A THESIS
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ABSTRACT

Recent widespread nursing manpower shortages and high rates of job turnover and absenteeism were indications of a serious nursing manpower problem. This study derived its impetus from these problems, and was undertaken in order to empirically identify and compare Alberta nurses' sources and levels of stress. Hospital and public health nurses employed at three agencies were surveyed using a questionnaire developed for this study. Approximately 370 questionnaires were returned, representing a response rate of 79%.

By employing the factor analysis technique, eight major stress sources arising from the nurses' work, home and social environments were identified. These eight stress sources formed the basis of a Nursing Stress Scale. The respondents' scores on each of the eight subscales were analyzed in order to determine their association with various employment and socio-demographic variables, and to examine the relationship between the nurses' stress levels and stress manifestations affecting their work performance.

The major study findings included the following:

1. The empirically derived Nursing Stress Scale provided reasonably valid measurements of the nurses' major stress sources arising from their work, home and social environments.
2. Hospital employment was associated with higher stress levels due to work tasks and roles, opportunities for personal and professional growth, and family conflicts.

3. Community health nurses experienced higher stress due to their level of job satisfaction.
4. The nurses' socio-demographic characteristics were related to variability in their perceived stress.
5. The nurses' stress scores were minimally related to their stress manifestations.
6. As only small amounts of the variation in the dependent variables used in this study were explained by the independent variables, there is a need to identify other variables that explain variability in the nurses' stress levels and that are associated with their stress manifestations.

Recommendations were made regarding the use of the Nursing Stress Scale in nursing human resource management practices, as well as the need for future research to test its applicability in other nursing work settings, and to identify other variables associated with nurses' perceived stress and stress manifestations.

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Table of Contents

Chapter Page
ABSTRACT iv
ACKNOWLEDGEMENTS vi
TABLE OF CONTENTS vii
LIST OF TABLES xi
LIST OF FIGURES xiv

1. INTRODUCTION 1
   1.1 Statement of the Problem 2
   1.2 Significance of the Study 4
   1.3 Research Approach and Objectives 5
   1.4 Assumptions and Limitations 6
      1.4.1 Assumptions 6
      1.4.2 Limitations 6
   1.5 Definition of Terms 7
   1.6 Format of the Thesis 8
2. A SELECTED REVIEW OF THE LITERATURE 9
   2.1 Definitions of Stress 9
      2.1.1 Response-oriented Definitions 10
      2.1.2 Stimulus-oriented Definitions 11
      2.1.3 Transactional Definitions 15
      2.1.4 Summary 18
   2.2 Conceptual Model of Stress Process 19
      2.2.1 Four Stages of Stress Cycle 20
      2.2.2 Linking Processes 22
      2.2.3 Summary 24
   2.3 Components of the Stress Process 25
      2.3.1 Potential Stressors 25
      2.3.2 Stress Manifestations 37
      2.3.3 Summary 40

2.4 Review of Nursing Stress Studies 40
2.4.1 Hospital Studies 41
2.4.2 Community Health Studies 58
2.4.3 Women, Nurses, and Stress 61
2.4.4 Summary 63
2.5 Research Methods in the Study of Stress 64
2.5.1 Study Design 64
2.5.2 Reliability and Validity Issues 66
2.5.3 The Issue of Causality 67
2.6 Summary of Literature Review 68
3. METHODOLOGY 71
3.1 Research Strategy 71
3.1.1 Experimental Design and Confirmatory Study Approach 73
3.1.2 Survey and Exploratory Approach 74
3.1.3 Data Collection Method 74
3.1.4 Target and Study Population 77
3.1.5 Sampling Design 77
3.1.6 Sampling Plans 78
3.2 Questionnaire Development 79
3.2.1 Identification of Content 80
3.2.2 Questionnaire Format 83
3.2.3 Selection of Questionnaire Items 85
3.2.4 Questionnaire Pretest 86
3.2.5 Results of Questionnaire Pretest 90
3.3 Questionnaire Distribution and Data Collection Procedures 93
3.3.1 Selection of Respondents 93

3.3.2 Questionnaire Distribution 95

3.3.3 Followup Procedures 96

3.4 Data Analysis Strategies 97

3.4.1 Descriptive Analyses 97

3.4.2 Factor Analysis of Stressor Variables 98

3.4.3 Nursing Stress Scale Development 102

3.4.4 Correlational Analyses 103

3.4.5 Analysis of Stress Score Variation 104

3.4.6 Multivariate Analysis of Stress 108

3.5 Summary 116

4. PRESENTATION AND DISCUSSION OF RESULTS 117

4.1 Sample Characteristics 117

4.1.1 Survey Response Rate 117

4.1.2 Socio-demographic Characteristics 118

4.1.3 Distributional Characteristics of Stress Data 123

4.2 Factor Analysis of Stressor Variables 138

4.3 The Nursing Stress Scale Development 145

4.4 Correlational Analysis 147

4.5 Results of Reliability Estimation 149

4.6 Stress Score Variation 151

4.6.1 Employment Variables 151

4.6.2 Socio-demographic Variables 158

4.7 Multivariate Analysis of Stress Data 168

4.7.1 Multiple Regression Analysis 169

4.7.2 Discriminant Analysis 188

4.8 Summary 213

5. SUMMARY AND RECOMMENDATIONS 214

5.1 Summary of the Study 214

5.2 Major Findings 217

5.3 Conclusions 220

5.4 Recommendations 223

REFERENCES 225

APPENDIX A: Draft Questionnaire 234

APPENDIX B: Correspondence Used in Questionnaire Pretest 237

APPENDIX C: Revised Questionnaire Used in Survey 244

APPENDIX D: Correspondence Used in Survey 247

APPENDIX E: The Nursing Stress Scale 253

LIST OF TABLES

Table Page

1. Sample Response Rates by Agency.................... 119

2. Respondents' Characteristics by Agency............. 120

3. Number of Respondents at Each Hospital by Clinical Specialty.............................. 124

4. Mean Response Score by Agency for Environmental Stressors........................ 125

5. Number of Possible Stress Manifestations........... 128

6. Number of Absences by Agency....................... 130

7. Number of Absences by Clinical Specialty........... 132

8. Number of Absences by Education Level.............. 133

9. Number of Absences by Age Category................. 134

10. Number of Absences by Marital Status............... 135

11. Number of Absences by Number of Dependent Responsibilities.................................. 136

12. Number of Absences by Reasons Given for Absence... 137

13. Factor Solution Derived by Varimax Rotation........ 139

14. Factor Identification of Variables Compared With Postulated Stress Source..................... 141

15. Correlational Analysis of Stress Scores............ 148

16. Reliability (Alpha) Coefficients for Stress Subscales... 150

17. Summary of Nursing Stress Scale Mean Score Variation by Agency................................ 152

18. Summary of Nursing Stress Scale Mean Score Variation by Work Setting.......................... 154

19. Summary of Nursing Stress Scale Mean Score Variation by City.................................. 155

20. Summary of Nursing Stress Scale Mean Score Variation by Area of Clinical Specialization....... 156

21. Summary of Nursing Stress Scale Mean Score Variation by Years of Fulltime Experience.......... 159

22. Summary of Nursing Stress Scale Mean Score Variation by Years of Parttime Experience.......... 160

23. Summary of Nursing Stress Scale Mean Score Variation by Level of Education.................... 162

24. Summary of Nursing Stress Scale Mean Score Variation by Age Category.......................... 163

25. Summary of Nursing Stress Scale Mean Score Variation by Marital Status........................ 165

26. Summary of Nursing Stress Scale Mean Score Variation by Number of Dependent Responsibilities................................. 166

27. Summary of Multiple Regression for STRESS1: Work Tasks/Roles.................................. 170

28. Summary of Multiple Regression for STRESS2: Personal/Professional Growth Opportunities......... 174

29. Summary of Multiple Regression for STRESS3: Social Support................................... 176

30. Summary of Multiple Regression for STRESS4: Personal Economic Security....................... 178

31. Summary of Multiple Regression for STRESS5: Family Conflict.................................. 179

32. Summary of Multiple Regression for STRESS6: Job Satisfaction................................. 181

33. Summary of Multiple Regression for STRESS7: Performance Appraisal............................ 183

34. Summary of Multiple Regression for STRESS8: Physical Working Conditions...................... 184

35. Summary of Multiple Regression for Number of Absenteeism Episodes.................... 187

36. Summary of Discriminant Analysis for Stress Response, Fatigue............................... 190

37. Summary of Discriminant Analysis for Stress Response, Irritability.......................... 193

38. Summary of Discriminant Analysis for Stress Response, Time Pressure......................... 195

39. Summary of Discriminant Analysis for Stress Response, More Coffee.................................. 196

40. Summary of Discriminant Analysis for Stress Job Dissatisfaction.................................. 198

41. Summary of Discriminant Analysis for Stress Forgetfulness.................................. 199

42. Summary of Discriminant Analysis for Stress Insomnia.................................. 200

43. Summary of Discriminant Analysis for Stress Thoughts of Resigning.................................. 202

44. Summary of Discriminant Analysis for Stress More Alcohol.................................. 203

45. Summary of Discriminant Analysis for Stress More Aches.................................. 205

46. Summary of Discriminant Analysis for Stress More Cigarettes.................................. 206

47. Summary of Discriminant Analysis for Stress Depression.................................. 208

48. Summary of Discriminant Analysis for Stress Anxiety.................................. 209

49. Summary of Discriminant Analysis for Stress Less Leisure Time.................................. 211

LIST OF FIGURES

Figure Page

1. A Conceptual Model of the Stress Process.............. 21

2. Research Strategy.................................... 72

3. Organization of Questionnaire Content................. 81

4. Conceptual Model Used for Data Analysis.............. 109

1. INTRODUCTION

Rising health care costs and demands for health services, amid current recessionary conditions and demands for public spending restraint, are forcing policy-makers' attention on the need for effective and efficient management of health care resources. Since the health sector is primarily a service industry, it is labor-intensive. Consequently, one potential area for effectiveness and efficiency gains is through improved management of the health sector's human resources.

Nurses constitute a major component of the health sector's human resources and are therefore an essential element in attempts to achieve economy in health services delivery. It is probable, too, that effective and efficient management of nursing manpower will translate into improved quality of health care since nurses are the major providers of direct patient care.

In response to the need for improved management of nursing manpower, one area requiring the researcher's attention is the waste of human resources due to the occupational and socio-psychological stress experienced by nurses. Several recent events contributed to a heightened awareness that nurses are experiencing more stress. Widespread nursing manpower shortages, high staff turnover, and elevated levels of absenteeism are symptoms of a serious manpower problem. This study derived its impetus from these events and was undertaken in order to empirically investigate nurses' sources and levels of stress so as to identify areas of nursing manpower management practice requiring review.

1.1 Statement of the Problem

Stress is a generic term encompassing a wide array of physiological and socio-psychological stimuli that result in broadly identifiable human responses. The multiplicity of factors comprising the concept has confounded its definition and has resulted, consequently, in a proliferation of stress definitions. Frequently stress is defined in terms of the reactions it provokes, especially physiological responses. Selye's name is most often associated with this approach (1976). Alternatively, stress is called an environmental stimulus that provokes individual arousal or emotion. As no widely acclaimed stress definition exists, stress measurement has been confounded and the effects have been observed in many fields, including medicine, psychology, sociology, and nursing.

Many stress measurement approaches have been attempted, including measurement of objective social conditions, individual perceptions of stress, and individual physiological, affective, and behavioral stress responses. Of particular concern to theorists, policy-makers, and researchers, has been the investigators' inability to accurately measure stress as a generic entity or phenomenon. As a result, meaningful comparisons and generalizations of findings have been restricted. Furthermore, the difficulties in adequately defining stress have limited the development of valid stress measurement tools. Within the nursing field specifically, stress investigations have proceeded with the use of measurement tools of unknown accuracy or validity. Furthermore, their research foci traditionally have involved examination of occupationally-derived stressors arising within the context of acute care hospital employment. Researchers have tended to concentrate on measuring the individual nurse's perceptions of environmental stressors and resultant psychological responses. However, as the research subjects have been primarily hospital nurses, it has been impossible to compare the sources or levels of stress experienced by nurses employed in various settings.

The definitional and measurement problems associated with the stress concept do not appear to be resolved soon. Consequently, it was most appropriate to investigate nurses' stress as a relative concept. Using a comparative approach, it would be possible to highlight relative differences between groups of nurses, and would thereby provide insights into the nature of their stress and areas for further investigation. Furthermore, a comparative approach would facilitate the subsequent development of a stress index that could be used to define the magnitude or intensity of specific stressor conditions and thus increase the basis for comparisons.

Within the context of the preceding discussion, the development of a valid measurement tool for the determination and comparison of Alberta nurses' sources and levels of environmental stress constituted the problem to be investigated. As stress measurement was envisaged as an evolving field, this investigation of Alberta nurses' stress is descriptive and exploratory.

1.2 Significance of the Study

Many occupational sectors have been investigated for their stress potential, but employee burnout due to job stress in human service organizations has received considerable attention recently. The specific reasons for this are unknown, but fiscal restraint in the health sector has likely been a factor. As nurses constitute a major component of human service providers, it is believed that their potential for occupational stress and burnout is high. Consequently, the determination and comparison of Alberta nurses' occupational and socio-psychological stress sources will provide information to support nursing administrators' efforts to effectively and efficiently manage their human resources. Emphasis was placed on the identification of environmental stressors amenable to management manipulation and on stress responses affecting work performance, thus enhancing the applicability of study findings. In particular, the specification of Alberta nurses' stressors will identify areas of management practice requiring special attention and evaluation. Determination of the socio-demographic characteristics associated with various levels of stress will contribute information relevant to nursing recruitment and selection practices. Furthermore, examination of the association between nurses' major stress sources and responses affecting their performance will assist in the development of policies pertaining to nursing manpower productivity and retention.

1.3 Research Approach and Objectives

The prime objective of the investigation was to determine Alberta hospital and public health nurses' sources of environmental stress and to compare their levels of stress. More specifically, the following research objectives were established:

1. To develop a valid tool for the measurement of nurses' sources of environmental stress;
2. To determine the level of stress experienced by nurses employed in Alberta acute care hospitals;
3. To determine the level of stress experienced by nurses working in the Alberta public health sector;
4. To compare the stress levels experienced by Alberta hospital and public health nurses; and
5. To identify significant variables associated with Alberta nurses' stress.

The measurement difficulties associated with the inadequately formulated construct necessitated a descriptive, exploratory approach. Consequently, the study involved a broad examination of the determinants of Alberta nurses' stress, plus the use of comparative analyses to elucidate its nature.

1.4 Assumptions and Limitations

In this section, the assumptions and limitations pertinent to this study are outlined.

1.4.1 Assumptions

The following assumptions were made at the outset of the study:

1. It was assumed that subjects had an awareness and preliminary understanding of stress by virtue of their training.
2. It was assumed that subjects were typical of Alberta nurses employed in the urban acute care hospital and public health sectors.

1.4.2 Limitations

The limitations pertinent to this study are listed below:

1. The scope of the study necessitated selection of subjects from two major areas of nursing employment; the acute care hospital and the public health sectors.
2. Establishment of the stress measurement tool's construct validity was desirable but unattainable due to the scope

of this study.

3. Nurses' stress was examined from a socio-psychological perspective.
4. The judgmental selection of the survey population precluded the assessment of representativeness; therefore, the generalizability of study findings was limited.
5. The thirty-two potentially stressful situations included in the questionnaire were not necessarily exhaustive.
6. The thirty-two stressors were presented using neutral phraseology. Consequently, it was impossible to determine the direction of the source of stress, that is, whether too much or too little, positive or negative, quantitative or qualitative.
7. The data collection techniques did not permit assessment of non-respondents' characteristics.
8. No attempt was made to determine causal relationships; the establishment of association was attempted however.

All findings of this investigation should be considered in view of these stated assumptions and limitations.

1.5 Definition of Terms

The following definitions clarify the terms used in this study:

1. STRESS: refers to a feeling, or state, of pressure or arousal experienced by an individual due to an environmental situation or demand that requires adjustment.

2. STRESSOR: refers to the antecedent environmental situation or demand that has the potential for initiating a stress response.
3. STRAIN: refers to the psychological, behavioral, and/or physiological response that follows stress.
4. NURSE: refers to any individual who has successfully completed an approved nursing education program and the qualifying nurse registration examinations entitling her/him to use the designation "Registered Nurse".
5. SCALE: refers to a measurement tool designed to reflect the attribute or construct under investigation. In this study, a nursing stress scale was constructed from an analysis of the responses to the questionnaire.
6. INDEX: refers to a composite measure of the attribute or construct under investigation (e.g., stress).

1.6 Format of the Thesis

The remaining components of the thesis comprise four chapters and five appendices. In the following chapter, the literature pertinent to the field of environmental stress, and nursing stress specifically, was reviewed. Chapter III consists of a description of the methodology and, the results are discussed in Chapter IV. A summary, major findings, and recommendations arising from the investigation are delineated in Chapter V. Appendices A, B, C and D, and Appendix E contain supplemental information relevant to Chapters III and IV respectively.

2. A SELECTED REVIEW OF THE LITERATURE

The purposes of this literature review are to examine the current status of knowledge related to the research objectives and to provide the theoretical foundations used in the development of the research methodology. The literature review is comprised of the following components: 1) an overview of the definitions of the stress concept, 2) a discussion of the conceptual model of the stress process used in this investigation, 3) an overview of selected aspects of the stress process, 4) a review of nursing stress studies, and 5) an examination of stress measurement strategies and issues.

2.1 Definitions of Stress

A plethora of imprecise, conflicting definitions of stress concepts and terms has hampered empirical investigations of socio-psychological stress by impeding the understanding of study findings and by restricting inter-study comparisons of results (Cummings & Cooper, 1979). The following examination of various stress definitions is presented first, to demonstrate these ambiguities and inconsistencies, and secondly, to clarify terms that will assist in the interpretation of the conceptual model and stress studies that were reviewed. For ease in presentation, definitions were categorized in the following manner:

- Response-oriented definitions;

- Stimulus-oriented definitions; and
- Transactional definitions.

2.1.1 Response-oriented Definitions

Stress definitions expressed in terms of a response, or a pattern of stress responses, are considered first since historically they preceded other types of definitions.

Selye's (1976) early investigations of the body's physiological response to noxious agents led to his observation of a generalized, tripartite adaptation syndrome in which the body responded to threats to its integrity in a characteristic manner. Initially, he observed that the body reacted with a state of alarm, followed by a stage of resistance in which the body coped with threats to the point of exhaustion. Following this, resistance declined, physiological breakdown occurred, and susceptibility to stress-induced diseases, the diseases of adaptation, increased (Cox, 1978, p. 6; Selye, 1976, p. 56). Selye noted that ability to cope was the critical factor determining whether or not individuals were stressed. By implication then, it was assumed that Selye believed that stress occurred at the point of exhaustion, that is, when coping responses failed. Since Selye believed that this characteristic response pattern occurred regardless of the nature of the stressor, he defined stress as "the nonspecific response of the body to any demand made upon it" (1976, p.55). His use of the term "nonspecific" generated controversy, however, as many stress writers maintained that the body responded in a highly specific fashion dependent upon the stress stimulus (Antonovsky, 1981; Baum, Singer, & Baum, 1981; Cox, 1975; Mason, 1975, cited in Baum et al., 1981; McGrath, 1976; Pelligrino, 1981; Singer, 1981). In later writing, Selye strove to resolve the debate surrounding this word by distinguishing between two types of stress responses; "eustress", which resulted from positive environmental stimuli, and "distress", which arose from unpleasant situations (Selye, 1976, p.171). Despite this differentiation, his skeptics continued to argue for a stress definition that incorporated differentiated response patterns according to the causative stressor.

Emphasizing the environmental characteristics that provoke stress, stimulus-oriented definitions are discussed next.

2.1.2 Stimulus-oriented Definitions

Cooper and Marshall (1976) utilized a stimulus-oriented perspective when they described occupational stress in terms of the negative environmental factors associated with a particular job. Similarly, Margolis, Kroes, and Quinn (1974) discussed the stress-producing effects of several job characteristics, including role ambiguity, task overload, and skill under-utilization.

Some writers compared stimulus-oriented definitions of stress to the engineering model of stress (Cox, 1978, p. 13;

Hinkle, 1974). Derived from Hooke's Law of Elasticity, the model states that "stress" results from the application of external forces (i.e., the load) and "strain" occurs if the body's elastic limit is exceeded (Wild & Hanes, 1976). It is noteworthy that the engineering term, "strain", parallels Selye's third stage of the general adaptation syndrome, the point at which exhaustion and subsequent physiological damage occurs.

Cox (1975, p. 493) employed the engineering analogy when he stated that "stress is what happens *to* a person, not what happens *within* him", whereas those writers using the response-based definitions described stress as an internal process (Hinkle, 1974). Cummings and Cooper (1979) observed that the use of the word "strain" has enhanced the understanding of the stress process because it further clarified the sequences involved. Alternatively, Antonovsky (1981, p.94) contributed another term to replace strain. He used "tension" rather than "strain" to refer to the individual's response to environmental stimuli or stressors.

Cummings and Cooper (1979, p.398), who defined stress as "any force displacing a variable beyond its range of stability", noted the role of adjustment processes in the person's attempts to reduce strain. While not described explicitly, these adjustment processes appear to parallel Selye's second response phase, the stage of resistance. Furthermore, they coined another stress term; "threat" was defined as the person's awareness of an impending stress or disruptive force. They justified this additional term on the basis that it would contribute a much needed temporal dimension and would provide a dynamic view of the stress process.

Stimulus-oriented conceptualizations of stress directed researchers' attention towards an examination of stressor characteristics. Three general themes emerged in the literature in this regard; 1) specification of stressor strength; 2) their valence, whether positive or negative, a loss or a gain; and 3) their environmental sources. Regarding stressor strength, stress was viewed as arising from too much or too little of an environmental stimulus. There was some evidence suggesting that the intensity of the stimulus was related curvilinearly to the degree of felt stress but it was not clearcut (McGrath, 1976, 1977). Investigators, concerned about the stressor's strength, frequently evaluated both the effect of its intensity and frequency of occurrence, on the subsequent stress response in order to measure its strength. (See for example Caplan, Cobb, French, Van Harrison, & Pinneau, 1980; Weiman, 1977).

The second theme, the valence of the stressor, has been evident in the occupational stress literature. Most writers tended to equate work stressors with negative job characteristics that subsequently resulted in dysfuncional outcomes (see for example Baum et al., 1981; Caplan et al., 1980; Cooper & Marshall, 1976; Karasek, 1979; Lazarus, 1981). Others described as stressors, events that require an adaptive response but that usually result in gain experiences (e.g., childbirth, marriage). Many writers discussed the need to avoid the use of value-laden terms because of their possible influence on the interpretation of study findings (Antonovsky, 1980; & McGrath, 1976). Antonovsky (1981, p.72), for example, proposed what he considered was a preferable definition:

> A stressor is...a demand made by the internal or external environment...that upsets [equilibrium], restoration of which depends upon a nonautomatic and not readily available energy-expending action.

To emphasize his point regarding the use of neutral terminology, Antonovsky declared that subsequent stress responses could be described as negative, neutral, or salutory.

The third theme, categorization of environmental stress sources, received considerable attention in the literature. It will be discussed in greater depth in Section 2.3.1, page 25, when potential environmental stressors are outlined.

Stimulus-oriented definitions of stress have been criticized for several reasons:

- their inherent assumption that an undemanding environment is not stressful (Cox, 1978, p. 13; Wild & Hanes, 1976);
- their failure to account for the independent, and often unperceived, effect of external stimuli on the focal person's eventual behavior (Wild & Hanes, 1976); and
- their failure to explain the intervening role of

psychological processes that mediate outcomes (Cox, 1978; Kyriacou & Sutcliffe, 1978).

These limitations resulted in the formulation of a third type of stress definition, transactional definitions. They are discussed in the following section.

2.1.3 Transactional Definitions

Definitions of stress described in terms of person-environmental interactions, were labelled "transactional" models of stress by Cox (1975). Their principal characteristic was a perceptual component in which the focal person evaluated potentially stressful environmental situations or demands in terms of his/her response capabilities. If, on the basis of this cognitive appraisal, a discrepancy existed between demand and coping ability, then a stress response occurred. Definitions of this type received substantial coverage in the stress literature, particularly in more recent publications. It is possible that these definitions have more appeal because they incorporate a dynamic, individualized role for the focal person and imply a mechanism through which individual differences are mediated. As explained by Lazarus (1966, cited in Baum et al., 1981),

> Psychological perspectives on stress emphasize the role of interpretation of stressors in the stress response. Response to stressors is determined by the degree to which an event is perceived as threatening, harmful, or challenging.

Furthermore, Baum et al. (1981) noted that a number of highly individual factors influence the appraisal process, including attitudes towards the stressor, prior experiences, training to deal with it, and knowledge of its consequences. Kahn and French (1970, cited in Wild & Hanes, 1976) emphasized, additionally, that the degree to which the individual perceives a particular stressor, and utilizes external cues and resources at his disposal, influences the cognitive appraisal process. They suggest, for example, that the environment continuously places demands on an individual of a greater or lesser urgency, and that some of these demands may be denied or ignored. Furthermore, the same individual may respond differently to the same stimulus on different occasions, or different individuals respond differently to the same environmental demand.

Those writers using transactional definitions viewed psychological factors as both intervening variables and actual environmental stressors. The preceding discussion demonstrated the role of psychological factors in a mediating capacity, while the present discussion focusses on their role as environmental stressors. Inclusion of psychological factors in stress theory helped to explain why a stress response could be evoked in the absence of an actual stressor. Studies of crowding, for example, demonstrated the presence of a stress response in individuals who expected to be crowded, even though actual crowding never materialized (Baum et al., 1981). Many writers also believed that anticipation or perception of a threat, regardless of its actual occurrence, was sufficient to evoke a stress reaction (Lazarus, 1966, cited in Wild & Hanes, 1976; and McGrath, 1976). Consequently, Lazarus defined stress as,

> a psychological condition involving the focal person's anticipation of his inability to cope effectively with a future demand.

He specified further, that this future demand must have negative consequences if the focal person failed to respond appropriately. Similarly, McGrath (1976) defined stress like Lazarus, but, unlike him, McGrath did not emphasize the noxious nature of the stressor consequences but rather called them "substantial consequences." Furthermore, he stated that the potential for stress was greatest in situations where uncertainty of outcome was maximal.

Several writers stated their preference for the transactional view of stress because it emphasized the dynamic, complex relationship of a person with his environment (Caplan et al., 1980, p. 88; Wild & Hanes, 1976) The operational definition of stress employed in this investigation conforms most closely with the transactional approach to stress (see Chapter 1, Section 1.5). Implicit within this definition was the expectation that subjects would appraise potentially stressful situations in terms of their individual attitudes, experiences, and training, and would view environmental situations as posing consequences if adaptive actions were not instituted.

2.1.4 Summary

In summary, inadequate stress definitions and their inconsistent application impeded the development of stress theory and interpretation of stress study findings. Three definitional approaches were delineated. First, stress was depicted as a physiological response to noxious agents. Selye's recognition in later years that the nature of the environmental stressor influenced the physiological response pattern, contributed to the wider appeal of this definition. Secondly, when stress was defined as an environmental stimulus or stressor, it approximated the engineering model of stress in which the application of external forces to a metal resulted in metal distortion or strain. This definition failed to account for individual differences in the stress response, however, and resulted in limited usage. Finally, transactional stress definitions were discussed. They emphasize the role of individual cognitive appraisal of environmental cues or demands. The perceived discrepancy between an environmental demand and response capabilities, in the situation of uncertain but expected substantial consequences for failure to cope, were critical elements in this definition. Awareness of these definitions will facilitate understanding of the conceptual model of stress, discussed in the following section.

2.2 Conceptual Model of Stress Process

The review of the occupational health and socio-psychological stress literature revealed a multiplicity of conceptual models of the stress process. Upon closer examination, however, it appeared that their underlying frameworks were very similar (Kyriacou & Sutcliffe, 1978, p. 4). Despite the apparent differences, the following basic elements were evident in the majority of the conceptual frameworks reviewed:

- sources of stress;
- appraisal processes;
- coping mechanisms;
- stress responses or manifestations.

The reader is referred to Antonovsky (1981), Blau (1981), Caplan, Cobb, French, Van Harrison and Pinneau (1980), Cox (1978), Cummings and Cooper (1979), Kyriacou and Sutcliff (1978), and Pearlin, Lieberman, Menaghan and Mullan (1981) for several examples of conceptual models. The main differences among them was the degree to which feedback mechanisms, intervening links, and adaptational processes were delineated. Young (1980) declared that the majority of models were similar to the black box process model. In other words, the input and output mechanisms were adequately described, but throughputs, the internal processes, were inadequately articulated. Furthermore, models that confined themselves to depicting the inputs and outputs tended to be static, whereas those that attempted to account for intervening processes presented a more dynamic picture of the stress process (see Antonovsky, 1980; Cummings & Cooper, 1979; Davidson & Cooper, 1981; Kyriacou & Sutcliffe, 1978).

Of the many conceptual models reviewed, McGrath's (1976) model was selected for use in this study (see Figure 1) because it incorporated the four basic elements in a dynamic picture of the stress process, while remaining conceptually simple but explicit. Another reason to select McGrath's model was the parallel socio-psychological perspective used by him and in this study. The following section provides an overview of his model, which has been modified slightly to suit the scope of this study. The model will be used in subsequent sections as the frame of reference for the presentation and discussion of the literature pertaining to its components.

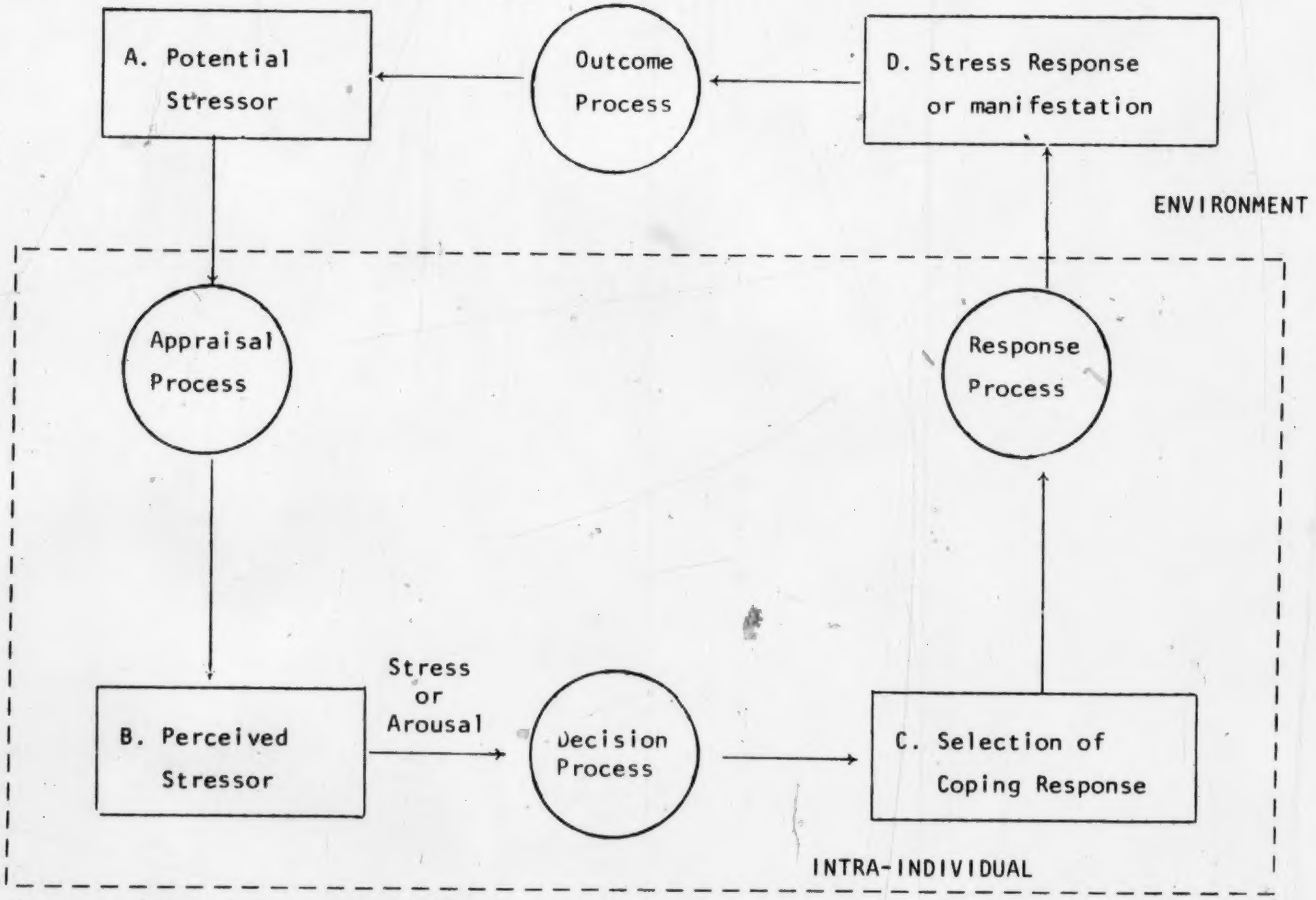
McGrath (1976) viewed the stress process as a four-stage, closed-loop cycle connected by four linking processes (depicted in Figure 1 as circles) and resulting from the interaction of two domains, the socio-physical environment, and the psyche of the focal individual. The four stages (depicted in Figure 1 as boxes) will be briefly described and then the linking processes will be examined.

2.2.1 Four Stages of Stress Cycle

As depicted in Figure 1, Box A, the stress cycle is initiated when the focal person is presented with a condition or set of circumstances (representing an

FIGURE 1

A Conceptual Model of the Stress Process


A. Potential Stressor
Outcome Process
D. Stress Response or manifestation
ENVIRONMENT
Appraisal Process
Response Process
B. Perceived Stressor
Stress or Arousal
Decision Process
C. Selection of Coping Response
INTRA-INDIVIDUAL

Source: Adapted from McGrath, 1976, p. 1356.

environmental demand) that requires action or a response. If the situational demand has the potential to result in an undesirable state of affairs if left unattended, it becomes in the mind of the focal person, a perceived stressor (Box B), regardless of the accuracy of the appraisal process. At this point, the focal person experiences arousal, or stress. Motivated by the desire to return to a usual state of affairs, the focal person selects a response alternative (Box C) that includes the possibility of escape behavior or inaction. The coping response is initiated with the intention of producing a satisfactory outcome, but the actual response (Box D) has consequences for both the individual and the original stress-provoking situation that are not necessarily intended.

2.2.2 Linking Processes

The four basic stages of the stress cycle are mediated by linking processes that, according to McGrath (1976), are the substance of the stress cycle. The first process, the appraisal process, accounts for the focal individual's subjective stress experience. Whether or not the individual's cognitive appraisal of the environmental demand has been accurate is incidental to the person's subsequent progression through the cycle. Rather, McGrath provided for individual differences in the environmental assessment when he noted that what is "one man's meat is another man's poison" (1976, p. 1360). Nevertheless, his brilliant study of little league baseball players demonstrated consistencies in the players'aggregate assessment of situational demands. To illustrate, McGrath observed, that not only did individual differences in perceived situational demand (i.e., task difficulty) lead to differences in the players' individual levels of arousal, but that their level of arousal tended to be high when the consequences of failure or gain were highest (i.e., when it mattered most to the team player) and when there was maximal uncertainty of outcome. By this latter phrase, McGrath meant that the perceived demand and the person's perception of his ability were so closely matched that the outcome could be either a team loss or a team gain.

A decision-making process constituted the second link in the stress cycle. It involved the individual's assessment of the perceived situation in light of available response alternatives, and the individual's selection of an appropriate response, or set of responses, that was intended to attenuate the undesirable situation. Factors affecting this process included the results of the appraisal process, past experiences, training, the person's current physiological and psychological state, and his repertoire of available and potential responses and resources.

The third process, the response process, involved the implementation of the selected coping strategies. The effectiveness of coping strategies in achieving the desired outcome could be evaluated in terms of their quantity, quality, and timing. At this point, most conceptual models of stress stopped, whereas McGrath identified a fourth link that completed his delineation of the cycle. Named the outcome process, this final link in the stress cycle involved the relationship between the focal individual's coping behavior or response and its effect on the initial stressful situation. According to McGrath, the final outcome depended on the focal person's ability to execute his response decision and the interaction of numerous environmental factors, including facilitative and opposing people and situations. McGrath focussed on the individual's behavioral response to a stressor and its' consequences for the situation. Other stress theorists expanded McGrath's view of stress responses to include other manifestations, specifically psychological and physiological stress outcomes (Antonovsky, 1981; Cooper & Marshall, 1976). Thus, McGrath's outcome process was modified for this study to include not only possible consequences for the initial stressful situation, but also consequences for the individual.

2.2.3 Summary

In summary, McGrath's (1976) conceptual model of the stress process was selected for use in this study. Comprised of four elements and linking processes, it was depicted as a closed-loop cycle occurring within the context of person-environment interaction. The cycle was initiated when potential environmental stressors were perceived as important demands with substantial consequences if left unattended. The focal person subsequently evaluated possible responses and implemented the selected coping behavior in an attempt to reduce the level of arousal. Behavioral, psychological and physiological stress reactions that resulted had consequences for the individual and/or the situation. This conceptual framework provided the foundation for the following review of the stress literature. Two major elements of the process were selected for in-depth review: 1) the sources of stress, and 2) the stress manifestations. No attempt was made to be exhaustive, rather, the intent was to discuss aspects considered relevant to this study's objectives.

2.3 Components of the Stress Process

In reviewing the literature pertaining to selected aspects of the stress process, components were discussed separately so as to maintain ease and clarity in presentation. However, it must be emphasized that the entire process is dynamic in nature and all components interact.

2.3.1 Potential Stressors

Various methods of classifying potential stressors were reported in the literature (Antonovsky, 1981; Baum et al., 1981; Cooper & Marshall, 1976; McGrath, 1976). One typology, for example, depicted three classes of stressors (Baum et al., 1981). The first, cataclysmic phenomenon, referred to sudden, unique, powerful events such as natural disasters that affect large numbers of people. They are acute events that require major adaptive response. Events of the second type included major challenges to people's adaptive abilities; however, fewer numbers are involved. Relatively short-term life events such as bereavement, marriage, or forced resignation are typical examples (Holmes & Rahe, 1967). Any of life's daily hassles or persistent life strains that require adjustment comprised the final class of stressors (Lazarus, 1981). They operated by continually pushing the person toward his adaptive limit, or by reducing coping ability for subsequent acute stressors (Pearlin et al., 1981). According to Lazarus (1981), daily hassles may have a greater effect on people's moods and health than the major misfortunes of life.

The investigation of stressful daily events and, in particular, stressors arising through the context of work has been a major concern for most researchers who investigated the input-side of the stress process. Some writers recommended the inclusion of potential nonwork stress sources into this category (Antonovsky, 1981; Cooper & Marshall, 1976; Pearlin et al., 1980). The majority of nursing stress studies focussed only on workplace stressors as the sole source of environmental stress (see Section 2.4; Cassem & Hackett, 1972; Hay & Oken, 1972; Gentry, Foster & Froehling, 1972; Gray-Toft & Anderson, 1981a,b).

Many conceptual reviews and empirical studies of environmental stressors are reported in the literature. They were selectively reviewed and organized for presentation according to the following framework:

- Occupational Tasks
- Occupational Roles
- Organizational Behavior Setting
- Physical Working Conditions
- Work Social Relationships
- Home and Social Environments

It represents a synthesis of the frameworks developed by Cooper and Marshall (1976) and McGrath (1976) to depict the major sources of environmental stress. Their frameworks provided the basis for the formulation of the conceptual framework for nurses' potential environmental stressors.

Proceding downward through the list, it is evident that stress potentially arises from six major environmental situations or demands. First, the nature of one's work tasks presents stressful circumstances. Inherent in this category were intrinsic job factors such as hours of work, time constraints, and the type of work. The second category involved stressors arising due to the person's work role(s). Included were such factors as conflict, ambiguity, responsibility for people and things, and opportunities for career development. The third category, the organizational behaviour setting, included stressors arising due to the structure, climate, and operating norms of the employing agency. Physical working conditions constituted the fourth potential stress category, and work social relationships, the fifth area. The final category, the person's home and social environment, included potential sources of stress such as family life crises, economic hardship, or daily hassles. The literature related to each of these areas was reviewed and is discussed in the following subsections.

Occupational Sources of Stress: Work Tasks

Most reported task-based stressors revolved around three parameters of tasks: their difficulty, ambiguity, and load (Blau, 1981; Cooper & Marshall, 1976; McGrath, 1976). *Task difficulty*, or qualitative overload as it is sometimes called, refers to work tasks that exceed or threaten to exceed the focal person's capabilities. Some evidence exists that the opposite, insufficient challenge or demand, could also be a source of stress (Caplan et al., 1980, p. 84). Studies conducted by Margolis, Kroes, and Quinn (1974) and Coburn (1975) demonstrated the relationship of both excessive and insufficient task difficulty to higher stress levels and lowered physiological and psychological well-being. McGrath (1976) on the other hand, demonstrated the negative effect of task difficulty on level of performance but did not observe its influence on the level of arousal experienced.

Task ambiguity arises when uncertainty exists about the task requirements or about the standards that will be used to judge task performance (McGrath, 1976). Caplan et al. (1980) investigated this concept in terms of ambiguity about future job components and demonstrated its moderate relationship (r = .39) with psychological strain, measured by job dissatisfaction and boredom.

The final parameter, *task under- and overload*, received considerable coverage in the literature, although emphasis was placed on task overload. A distinction was drawn by some researchers between quantitative (i.e., too many equally competing demands) and qualitative (i.e., task difficulty) overload. Several studies demonstrated relationships between workload (under- and over-) and increased levels of stress, while others confirmed relationships between the workload and subsequent stress manifestations (e.g., job dissatisfaction and intention to resign) (Caplan et al., 1980, p.80; Cooper & Marshall, 1976; Davidson & Cooper, 1981; Margolis et al., 1974; McGrath, 1976; Mechanic, 1962). Several comprehensive and extensive summaries of this research were found in the literature (see Antonovsky, 1981; Blau, 1981; Cooper & Marshall, 1976; Davidson & Cooper, 1981).

Work Roles

A role occurs as a result of the relationship between two or more people. According to the definitions of several writers (Van Sell, Brief & Schuler, 1981; Kahn, Wolfe, Quinn, Snoek & Rosenthal, 1974 cited in Wild & Hanes, 1981; McGrath, 1976), a role is a set of expectations applied to the incumbent of a particular organizational position by himself, by members of his role set (i.e., the persons with whom he has a continuing relationship), and by role senders within and beyond the organizational setting. For any focal person, there is a "sent role" and a "received role", consisting of the person's perception and understanding of what was sent. Inherent in this process is the possibility of inconsistent and contradictory "sent roles", called role conflict, and lack of clearly articulated expectations, called role ambiguity. Both concepts, role conflict and ambiguity, received considerable attention in the literature and only a brief overview is possible within the scope of this study.

Role conflicts may arise from too many contradictory expectations from too many senders. This typically occurs for the man-in-the-middle at the intersect of management and worker expectations, but may also occur through the juxtaposition of professional and bureaucratic expectations in the health care setting (Kahn et al., 1964; McGrath, 1976). Another form of role conflict that is particularly relevant to this study arises from work expectations that conflict with the focal person's values, morals, or principles (McGrath, 1976). A study by Cherniss (1980, p. 47) provided some evidence to support this contention.

Cooper and Marshall (1976) summarized the literature related to role conflict and demonstrated evidence of a relationship between workers' role conflict and the existence of stress manifestations, including lower job satisfaction, higher reported levels of job tension, increased pulse rates, and more electrocardiographic abnormalities. Furthermore, they concluded from their study that white collar workers were more prone to work-related role conflict than blue collar workers. Others reported similar correlational evidence to support the hypothesis that role conflict was related to unfavorable stress-related outcomes (Caplan et al., 1980; House & Rizzo, 1972; Kahn et al., 1964; McGrath, 1976).

Van Sell et al. (1981, p. 44) noted that *role ambiguity* arises when role expectations, methods for meeting expectations, and/or the consequences of role performance are unknown. Furthermore, Kahn et al. (1964, p. 94, cited in McGrath, 1976) added that organizational complexity and the pace of technological change contributed to stress due to role ambiguity. Most studies of role ambiguity demonstrated its moderate relationship with lower levels of job satisfaction, self-confidence, and higher levels of job tension (Cobb, 1974; Kahn et al., 1964 cited in McGrath, 1976; Margolis et al., 1974; McGrath, 1976).

Another relevant role stressor is *responsibility for people*. Cooper and Marshall (1976) summarized the literature in this area and demonstrated its relationshp with stress outcomes. They found, for example, that responsibility for people was significantly more likely to result in cardiovascular heart disease (CHD) than responsibility for things.

They suggested that this was due to the need for more people interaction.

Organizational Behavior Setting

McGrath (1976) defined the organizational behavior setting as the workplace physical environment with its associated social patterns and behavioral opportunities. Both factors place demands and constraints on behavior. Similar to the effect of work task stressors, the behavior setting may provoke stress because of demand difficulties, ambiguity, and load requirements. Some examples provided by McGrath (1976) included stress arising from over- or under-staffing, environmental constraints, contingencies, performance standards, or the availability of equipment necessary for job performance. McGrath's behavior setting was equivalent to Cooper and Marshall's (1976) concept of stress associated with the organization's structure and climate. Cooper and Marshall (1976) noted the increasing research attention accorded this area, particularly as it related to the effects of employee participation in the workplace. They reported that early research investigations of worker job participation focussed on its relationship with worker productivity and attitudes. Studies, reviewed by Cooper and Marshall (1976), suggested that higher productivity, greater job satisfaction, lower turnover rates, and better supervisor-subordinate relationships were associated with worker participation in the workplace.

Furthermore, they reviewed several studies that demonstrated a significant association between higher levels of opportunities for worker participation in decision-making and greater job satisfaction, lower feelings of job threat, and higher levels of self-esteem. Similarly, the study by Margolis et al. (1974) found that nonparticipation at work was significantly associated with the following health risks: overall poor physical health, escapist drinking, depressed mood, low self-esteem, low life and job satisfaction, low work motivation, intention to quit, and increased work absenteeism. It is noteworthy that nonparticipation proved to be the strongest predictor of all the risk factors, while skill underutilization was the second best predictor. Studies demonstrating similar findings were reported by Qvale (1981) and Sheridan (1981).

Physical Working Conditions

Potential stressors in the physical work environment include noxious or dangerous conditions (e.g., temperature extremes, exposure to radiation), or simply unpleasant environs (e.g., excessive noise, heavy traffic). McGrath (1976) stated that the focal person's cumulative knowledge and understanding of an environmental condition influences the perception of it as a threat. Application of his notion to the health care setting suggests that rapid technological change and exposure to possibly hazardous technologies may not be perceived as threats if the focal person is unfamiliar with them. On the other hand, they may represent qualitative task difficulties and thus provoke stress.

Evidence of the stress associated with physical working conditions is less available in the socio-psychological literature. As most reported studies were concerned with machine operators, firemen, or policemen as subjects, their relevance to this study was limited, and consequently they were not reviewed.

Work Social Relationships

The nature of relationships with one's supervisor, subordinates, and colleagues constitutes the fifth major source of stress (McGrath, 1976). In contrast, Cooper and Marshall (1976) found little conclusive evidence in this category. This disparity is not surprising, however, since Cooper and Marshall focussed on the medical literature while McGrath reviewed the socio-psychological literature.

Poor social relations were defined by French and Caplan (1973, p. 48 cited in Cooper and Marshall, 1976) as those that include low trust, low supportiveness, and low interest in listening and trying to deal with problems that confront the organizational member. Several studies provided evidence of an association between reported job stress and poor social relationships (Caplan et al., 1980; Kahn et al., 1964 cited in Baum et al., 1981; Marshall and Cooper, 1976). Furthermore, Kahn et al. (1964, cited in Marshall & Cooper, 1976) demonstrated a positive relationship between co-worker mistrust and higher role ambiguity, inadequate communication, and job dissatisfaction. Findings from Cooper and Marshall's (1979, p. 74) study of executives under pressure demonstrated that existence of the following two factors reduced the development of stress due to work social relationships:

- the organizational structure and climate that allowed freedom of expression regarding inability to cope, fears, and the need for assistance, and
- the existence of individual awareness of the need to communicate meaningfully.

Further evidence of the relationship between work social relationships and stress outcomes were provided in other studies. LaRocco and Jones (1978), for example, showed that the level of co-worker and leader support was associated with job satisfaction, self-esteem and job retention, while Qvale (1981) reported that coal miners, required to change from highly inter-dependent social and work group relationships to specialized and isolated work groups, experienced negative social and psychological consequences. These negative effects were subsequently reflected in reduced worker productivity.

Non-occupational Sources of Stress: Home and Social Environments

Cooper and Marshall (1976) observed the increasing research focus on extra-organizational sources of stress. In particular, they noted that the psychological and social consequences of dual career families have received more attention recently. They maintained, however, that more research is needed to identify these stressors and to assess their degree of influence in stress-related outcomes, particularly disease.

One approach to the study of non-work stress sources was an investigation of the influence of life events on subsequent stress outcomes. Vinokur and Seizer (1975) examined the relationship of desirable and undesirable life events on stress arousal and subsequent mental distress. They demonstrated that an accumulation of life events (as measured by the Holmes and Rahe Scale) was related to perceived stress and evidence of emotional disturbance. It was noteworthy that the relationships were strongest for undesirable or negative life events. A similar study supported the role of off-the-job experiences in the subsequent development of stress responses (Paradine, Higgins, Szeglin, Beres, Kravitz, & Fotis, 1981). They determined, however, that the relationship held only when non-work stressors were allowed to interact with work stressors. This observation by Paradine et al. falls within the current debate in the literature regarding the role of social support in the stress process. It is generally unknown whether social support acts in a direct or buffering role (Blau, 1981; Ilfeld, 1976; Pearlin et al., 1981).

In summary, the literature related to six categories of environmental stress sources was reviewed. These potential environmental stressors constituted the first stage of

McGrath's conceptual model of the stress process. His final stage, the development of stress manifestations, will be discussed next.

2.3.2 Stress Manifestations

The following three categories of stress manifestations were reported in the literature: physiological, behavioral, and psychological responses. A brief overview of the literature pertaining to each category will be presented, although overlap occurs because researchers tended to investigate two or more categories of response per study.

The physiological stress manifestations received the least attention in the socio-psychological literature, presumably due to the disparate focus and the logistical considerations involved. Cooper and Marshall (1976) summarized the literature linking environmental and individual stressors to physical and mental diseases or illnesses. In their seminal report, they documented evidence of an association between stress and coronary heart disease (CHD), such as more risk factors, death from CHD, elevated heart rate, and mental ill health, including depression, anxiety, and neuroticism. Froberg et al. (1969), alternatively, studied the influence of stressful work conditions on psychological and endocrine stress reactions. They found that relatively short duration and low intensity stressors provoked marked changes in endocrine function. Furthermore, in a study of twelve invoicing clerks, their results suggested that changes in endocrine function coincided with the clerks' subjective reports of psychological stress responses, including feeling time pressure, fatigue, and backache. This was a meaningful finding as often subjective stress measurements and associated stress manifestations are viewed skeptically (Cooper & Marshall, 1976).

Several other researchers found associations between job stress and physiological stress responses, including increased visits for medical attention, altered blood chemistry (e.g., cholesterol), essential hypertension, obesity, and peptic ulcer (Hoiberg, 1982; Rahe et al., 1972; Weiman, 1977). Weiman, furthermore, found that his subjects experienced the highest incidence of physiological stress outcomes when their work stress scores were either high or low. On the basis of this finding, he suggested that work stressors and disease are related curvilinearly.

The second category, behavioral stress manifestations, included such outcomes as increased coffee, cigarette and alcohol consumption, increased smoking and drug usage, higher absenteeism and job turnover rates, and altered levels of job performance. Conway, Ward, Vickers, and Rahe (1981, p. 161), for example, followed thirty-four Navy commanders over an eight month period in order to assess the effect of work stress on their coffee, cigarette, and alcohol usage. Despite observing highly individualized patterns, they found the following:

- habitual cigarette smoking and coffee consumption were associated with the tendency to perceive high stress;
- chronic alcohol consumption was not associated with stress perceptions; and
- on average, cigarette and coffee usage increased on the days perceived as high stress and, on the same days, less alcohol was consumed.

They concluded by suggesting that individual differences in the consumption of all three products begin in response to stress but, once habits are developed, are unresponsive to variability in stress perceptions.

Margolis et al. (1974) found that, for 1500 male workers, above average absenteeism rates were significantly associated with high stress scores, while Blau (1980) observed that bus drivers' perceived job stress was associated with job dissatisfaction but not with their level of job performance.

The final stress manifestation, psychological outcomes, has been highlighted in the previous discussions. Job dissatisfaction was investigated most frequently, and was found to be associated with increased levels of job stress generally, or with specific aspects of job stress, such as skill underutilization (Blau, 1981; Bedian et al., 1981; Caplan et al., 1980; Davidson & Cooper, 1981; Locke, 1976; Margolis et al., 1974). Other psychological stress manifestations that were studied included anxiety, depression, irritation, and boredom (Caplan et al., 1980; Pearlin et al., 1981). While the findings generally suggested their association with job stress, the obtained correlations were low to moderate.

In summary, the literature related to three categories of stress manifestations was highlighted. Study findings generally showed that job stress was associated somewhat with physiological, behavioral, and psychological responses in the individual.

2.3.3 Summary

In summary, the literature pertaining to potential environmental stressors and stress manifestations was reviewed. A synthesis of two frameworks for categorizing environmental stress sources suggested six potential areas that encompassed the individual's work, home, and social environments. Work tasks and roles, the organization's structure, climate, and physical working conditions, and co-worker relationships were the predominate stressors; the home and social environments presented stress- provoking demands to a lesser extent. Three types of stress manifestations were reported in the literature: physiological, behavioral, and psychological responses. Behavioral and psychological responses such as absenteeism, job turnover and dissatisfaction predominated.

2.4 Review of Nursing Stress Studies

Investigations concerned with nurses' stress were reviewed in order to provide background information to which the study approach and results could be compared. Studies of hospital and community health nurses' stress were examined from the following perspectives:

- their foci and stress perspectives;
- the research strategies employed;
- determinants of nurses' stress;
- study findings; and
- relationship of nurses' stress to the nature of a female-dominated occupation.

2.4.1 Hospital Studies

In this section, studies reporting hospital nurses' stress are reviewed. No attempt was made to be exhaustive; rather studies were selected in order to highlight general themes and trends.

Study Perspectives

As noted by Stehle (1981), nursing stress investigations of the sixties and early seventies were conducted for the purpose of substantiating the presence of critical care nurses' stress and to describe its antecedents. The initial emphasis on intensive care unit (ICU) nurses coincided with the inception of ICU's but it gradually yielded to include other specialty care nurses including coronary, paediatric, and neonatal intensive care nurses. Studies conducted by Cassem and Hackett (1972), Hay and Oken (1972), and Vreeland and Ellis (1969) are typical of this early period. Each attempted to identify specific stressors in the critical care nurse's work environment, although Hay and Oken (1972) provided an exception to the general trend by incorporating psychological stressors originating within the ICU nurse. The majority of early studies, however, concentrated on identifying external, work-related stressors. The major work stressors identified by these studies included patient care activities, new technologies and equipment, and multiple interpersonal conflicts.

The trend to investigate ICU nurses' stress sources has continued to the present time. More recently, however, the focus expanded to include studies of oncology, hospice, ambulatory care, medicine and surgical nurses' stress (Arcand, 1980; Brosnan & Johnson, 1980; Gray-Toft & Anderson, 1981a; Maloney & Bartz, 1983; Moser and Krikorian, 1982; Pinnell, 1979; Vachon, 1979). It appears that as critical care units became commonplace, factors other than unfamiliarity replaced the motivation to study them. In the mid to late seventies, shortages of experienced critical care nurses provided the impetus for many stress studies; and, later, hospital-wide nursing shortages prompted studies that were formulated to assess the reasons why nurses were leaving the occupation (Bailey, Steffen & Grout, 1980; Gray-Toft & Anderson, 1981b; Huckabay & Jagla, 1979).

Evidence of all three stress definitions were found in the nursing literature reviewed; however, stress was usually regarded as a stimulus (Grout, 1980). Exceptions were Bailey et al., (1980), who emphasized the critical role of individual perception and appraisal in the stress process, and Vachon (1979), who described the development of nurses' stress based on the concept that individual coping resources are finite and, once depleted, fail to prevent the development of stress.

In a comparative review of the evidence surrounding ICU nurses' and air traffic controllers' occupational stress, Grout (1980) observed that the nursing stress literature paid little or no attention to their physiological or psychological stress responses, but instead focussed on identifying and rank ordering their environmental stressors. Furthermore, he noted the paradox (as did others; see for example Bailey et al., 1980) of a group of respondents identifying an environmental situation as both a stressor and a job satisfier. This observation reinforced his view that nursing stress studies must take into account individual differences in perception and appraisal.

Stehle (1981) reported the absence of theoretical frameworks in twenty-eight articles that she reviewed and further noted that schemes for categorizing stressors were present only periodically. Similar observations were made in the present review of the nursing stress literature but with notable exceptions; studies conducted in association with academic settings generally proceeded from a theoretical framework (Bailey et al., 1980; Gray-Toft & Anderson, 1981a,b; Huckabay & Jagla, 1979; Pinnell, 1979).

Research Strategies

In a review of critical care nursing stress studies that covered a fifteen year time span (1965-1979), Stehle (1981) observed that most studies involved a descriptive research approach. Specific research strategies included observation, personal interviews, and mail surveys. Of the nursing stress studies reviewed for this study, the majority were descriptive, exploratory, cross-sectional surveys that involved the use of questionnaires. No study was found that employed experimental designs (Grout, 1980), however Brosnan and Johnson's (1980) study, while descriptive, employed a quasi-experimental strategy. They defined control and study groups and compared their stress levels after the study group was exposed to an organizational change. Other studies were pilot studies that involved stress questionnaire development (Gray-Toft & Anderson, 1981a; Moser & Krikorian, 1982). Most involved small study samples (i.e., less than 200 respondents) although a study conducted by Bailey et al. (1980), involved a large number of ICU nurses (n=1800).

Determinants of Nurses' Stress

Since most nursing stress studies sought to identify the reasons for the nursing manpower exodus, it was not unexpected that they attempted to determine external or organizational sources of nurses' work stress. Only a few researchers included intra-individual characteristics and personal life events as potential sources of nurses' stress

(Armstrong, King & Miller, 1982; Bailey et al., 1980; Cresswell, Corre, & Zautra, 1981; Felt, 1982; Lavandero, 1981; Maloney, 1982; Moser & Krikorian, 1982).

The study by Cresswell et al. (1981), for example, was designed to assess the relationship of both positive and negative life events with hospital employees' measures of perceived quality of life. Two factors were found to be most predictive of respondents' life satisfaction and perceived ability to cope: family and social support groups. Furthermore, they determined that negative life events were more powerful predictors of life quality than positive life events generally. In contrast to these findings, Moser and Krikorian (1982) found somewhat conflicting results. Employing an open-ended response format, they asked hospice nurses to identify the major factors influencing their levels of stress and job satisfaction. The reported 'stressors' and 'satisfiers' could be placed into three categories: client and family care, working conditions, and personal concerns. The personal concerns category, which included such items as threats to personal safety, worries about own family, and family and friend relationships, ranked third in importance and accounted for less than twenty percent of respondents' levels of stress and job satisfaction.

Others examined the role of personality traits in the subsequent development of stress responses, especially the response "burnout". Two studies found that nurses, with high personal expectations and exhibiting type A behavioral characteristics in combination with excessive workloads, were prone to the development of "burnout" symptoms (Armstrong et al., 1982; Lavandero, 1981). The results are by no means clearcut, however, as is demonstrated by the findings of a study by Ivancevich and Matteson (1980). They compared the work stressors experienced by two groups of registered nurses who were scaled on the basis of exhibiting either type A or B behaviors. The type A nurses perceived hospital politics and their lack of participation in decisions most stressful, while type B nurses rated low job rewards and human resource development most stressful. Both groups of nurses identified responsibility for people and time pressures as significantly stressful job factors. This finding is surprising given that type A personalities are usually associated with feelings of time pressure.

In another study, Maloney and Bartz (1983) compared two groups of respondents, ICU and non-ICU nurses, on the basis of personality characteristics that are supposedly associated with stress-tolerant behavior (sense of commitment, internal control, and seek challenge). They expected to confirm the highly stressful nature of ICU nursing but instead obtained mixed results. Both groups of nurses displayed some degree of stress tolerance, despite the finding that non-ICU nurses experienced significantly higher levels of anxiety, somatic complaints, personal and family problems, and workload dissatisfaction. These results led the researchers to conclude that nurses self-select specific employment areas and that further study is needed to identify optimal personality characteristics for specific nursing specialties. Given the conflicting results and inherent difficulties, it is not surprising that most nursing stress studies avoided the role of individual factors in the development of stress outcomes. A few studies sought to overcome these difficulties, however, by assessing the impact of personal and demographic characteristics on stress perceptions (Anderson & Basteyns, 1981; Arcand, 1980; Huckabay & Jagla, 1979; Pinnell, 1979). Their results were mixed, but age, level of education, years of experience, and nursing specialty appeared to be the most promising factors to examine in future research.

As previously noted, the identification of occupational stressors constituted the primary objective of most nursing stress research. A review of the recent nursing stress literature revealed four predominant themes concerning work stressors: the traditional concerns of role and task-based stress, and two new areas, the lack of role fulfillment and non-participation in decision-making. Studies pertaining to these four areas will be reviewed in the following subsections.

Role Stress

Rosse and Rosse (1981) reported that role conflict and ambiguity were positively related to perceived job stress and a nurses' intention to resign, and negatively correlated with job satisfaction and committment to the employing agency. Furthermore, they observed that person-role conflict, that is where one's values and beliefs conflict with role expectations, was the strongest single predictor of employee loyalty and perceived job satisfaction. Contrary to what is generally reported in the nursing stress literature, Rosse and Rosse did not observe higher levels of role overload in ICU and CCU nurses and, they found unexpectedly, that nurses with longer job tenures reported higher levels of role conflict. They concluded:

> Our results provide strong and consistent support for the growing body of research showing role perceptions as important determinants of an individual's attitudinal and behavioral response to the job situation (1981, p. 401).

Other studies confirmed the results obtained by Rosse and Rosse and provided further insights into the relationship between nurses' role stress and co-existent stress manifestations (Bedian, Armenakis, & Curran, 1981; Posner & Randolph, 1980). All substantiated the relationship between role stress and perceived job stress. Furthermore, Bedian et al. (1981) demonstrated that role stress was directly related to a propensity to leave the job. Two groups of researchers examined the relationship between role stress and the individual's level of job performance but obtained conflicting results. Bedian et al. (1981) found no relationship between the two factors when job performance was rated by supervisor appraisal, whereas Posner and

Randolph concluded that a negative association existed between role conflict, role ambiguity, and measures of performance level. Their measure of performance was determined by self-appraisal so it is not unreasonable to conjecture that method variance contributed to the discrepancy in results.

Recently, the *American Journal of Nursing* (1983) published the results of a Massachusetts report that suggested the reasons why nurses were leaving the occupation. Chief among the nurses' concerns were the following components of role stress: the inability to fulfill family responsibilities, and dissatisfaction with their professional role, especially in the areas of physician interactions and the lack of opportunity to practice primary care. Similar concerns were expressed by nurses who responded to the Alberta Hospital Association nursing manpower study (1980).

Task Stress

The traditional concern of task-based stress was widely reported in the nursing stress research literature. In particular, several stress researchers reported the existence of significant stress associated with death of a patient or care of a dying and suffering patient (Arcand, 1980; Gray-Toft & Anderson, 1981a; Pines & Kanner, 1982). Many others found that stress associated with patient care and their families was a significant stressor for nurses

(Gray-Toft & Anderson, 1981a; Ivancevich & Matteson, 1980; Moser & Krikorian, 1982; Pines & Kanner, 1982; Pinnell, 1979; Yamashita, 1981). Frequently patient-centred stress was cited as arising from the responsibility for people, or occurring during the nurses' attempts to meet the emotional needs of patients and their families. Several studies reported that demands for patient care constituted a powerful nursing stressor. To illustrate, Arcand (1980) observed that two-thirds of the work stress variation experienced by the oncology nurses in her sample was explained by patient suffering and death, while Moser and Krikorian (1982) established that client and family care accounted for thirty-eight percent of their respondents' variation on stress experience. Exemplary of the confusion surrounding the determination of nurses' stressors is a report, also by Moser and Krikorian, of hospice nurses' greatest source of job satisfaction. They reported that client and family care accounted for fifty-six percent of the nurses' job satisfaction variation. Other researchers suggested that patient care is both a stressor and a satisfier (Bailey et al., 1980; Brosnan & Johnson, 1980). What remains to be determined in future research efforts are the factors that tip the balance. Two nursing writers suggested indirectly that the answers lie in nurses' coping abilities. Vachon (1979) believes that depletion of a nurse's finite reserves leads to stress outcomes; and Shires (1983) suggested that not only do nurses require nurturing as do their patients, but they must develop their coping skills to prevent burnout and feelings of job alienation.

Task-based stress associated with excessive workloads (quantitative) was the second predominant work stressor reported in the literature. In one study of 122 nurses employed on typical hospital nursing units (Gray-Toft & Anderson, 1981), it was concluded that their greatest source of stress was the workload. Similarly, other researchers have reported that time pressures, and the inability to complete patient care tasks combined with the inability to maintain one's professional standards, are major sources of nurses' work stress (Cook & Mandrillo, 1982; Ivancevich & Matteson, 1980; Moser & Krikorian, 1982; Pines & Kanner, 1982).

Lack of Role Fulfillment

Rosse and Rosse (1981) concluded that nurses' role perceptions are increasingly important determinants of their attitudinal and behavioral response to the job. Judging by the number of recent articles in the nursing literature dealing with nurses' lack of self-actualization and quality of working life issues, their conclusions seem justified. Colavecchio (1982), for example, surveyed clinical specialists, new graduates, and staff nurses to determine the reasons why nurses leave direct patient care positions. The four major concerns she identified included dissatisfaction with the quality of care they were able to deliver, the quality of their working life, their interpersonal relationships, and the level of recognition accorded to nursing work. Similar findings were reported by Seybolt, Pavett, and Walker (1978). Nurses left their jobs because of low job satisfaction, the lack of positive patient outcomes, limited opportunities to utilize their skills and abilities, and because they were not valued or rewarded for performing well. Other researchers reported similar findings (Cheathan & Stein, 1982; O'Donovan & Bridenstine, 1983; Park, 1983). Park (1983) attributed the problem to the higher job and life expectations of babyboom children, while O'Donovan and Bridenstine (1983) suggested that nurses' stress arises because their personal committments and responsibilities were incompatible with rotating shift schedules. Earlier studies of the effects of shiftwork provided support for the notion that nurses dislike shiftwork because of its incompatability with social and family lives, and its physiological and emotional effects (AHA, 1980; Baker, 1980). The Alberta Hospital Association's nursing manpower study (1980) surveyed registered nurses in order to identify factors promoting their job satisfaction, their reasons for entering and leaving nursing, and the conditions necessary for their return to nursing if they were inactive at the time of the study. The researchers found that the most important factor sustaining job satisfaction was a feeling of accomplishment, while the greatest source of job dissatisfaction was inflexible nursing administration policies and practices. Dual career conflicts were cited as the major reason for leaving nursing; and the respondents stated they would return to active nursing if parttime and flexible hours were available. Similar findings were reported in U.S. studies (ANA Academy, 1983; California hospitals, 1983; New study, 1983).

Nonparticipation in Decision-making

O'Donovan and Bridenstine (1983) described the current nursing situation as "the handmaiden revolt". This appears to be an apt label as many writers suggested that nurses are stressed because of their non-participation in decisions affecting patient care and in decisions affecting their conditions of work. Bopp and Rosenthal (1979), for example, reported their success in reducing excessive nursing turnover rates by including nurses on hospital committees that made decisions about patient services, and by implementing monthly employee-management meetings. Ryan (1981) suggested that the current nursing problems of burnout and turnover are due to nurses' feelings of helplessness due to their lack of success with patient outcomes and lack of input into nursing policies. Lavandero (1981), Storlie (1982), and Stroud (1983) concurred, as they all stated that nurses lack power to ensure professional control over the many spheres of their practice. Three American studies provided similar conclusions and fully supported the notion of increased management participation by nurses (ANA Academy, 1983; California hospitals, 1983; New study, 1983). It would appear that half measures in this regard are unacceptable to nurses. Mercandente (1983) empirically assessed nursing committee members' perceptions of their role in participatory management. A major finding was that the forty commmittee members did not believe their role was fully participatory, but rather they believed that they were treated only as consultants.

During the review of the hospital nursing stress studies, several stress measurement tools were located in the literature (Arcand, 1980; Gray-Toft & Anderson, 1981a; Huckabay & Jagla, 1979; Pinnell, 1979; Yamashita, 1981). The tools had several common features, including their target populations (hospital nurses), their conceptualization of the sources of nurses' stress (occupationally-derived) and their response format (Likert-type response alternatives). All of the tools attempted to assess the frequency of occurrence of the potential stressor. Three researchers, additionally, employed stress questionnaires that included a measure of the stress intensity (Arcand, 1980; Pinnell, 1979; Yamashita, 1981). These three researchers then multiplied the frequency and intensity components together to obtain a composite stress index for each respondent. No rationale was provided, however, to justify this step. Arcand (1980) and Pinnell (1979) employed an operational definition of stress that was similar to the transactional definitions previously described. Furthermore, their categorization of nurses' stress sources was consistent with McGrath's (1976) model of environmental stressors. However, none of the previously cited questionnaires contained items designed to determine nurses' potential home and social stressors, nor did they include nonhospital-based nurses in their target samples.

In summary, four major sources of nurses' environmental stress were identified in the literature: role stress, task stress, lack of role fulfillment, and non-participation in decision-making. The latter two stressors can be viewed as extensions of the more traditional role stress. In the following section, a brief overview of the findings pertaining to nurses' stress manifestations will be provided.

Study Findings

The literature pertaining to nurses' responses to stress can be roughly divided into two categories: behavioral and psychological strains. As observed by Grout (1980), measures of nurses' physiological stress responses have been performed rarely. Given that most investigations of nurses' stress involved cross-sectional approaches using survey methods, this tendency was not unexpected. Several behavioral stress manifestations have been investigated, including burnout, job turnover or propensity to leave, increased absenteeism, and lower levels of job performance (Armstrong et al., 1982; Bedian et al., 1981; Pelt, 1982;

Gray-Toft & Anderson, 1981a; Hagemaster, 1983; Lavandero, 1981; Park, 1983; Pines & Kanner, 1982; Seybolt et al., 1978; Weisman et al., 1981). In addition to its reported negative consequences for the quality of care and maintenance of experienced nursing staffs, burnout was found to be related to dishonesty and unauthorized work break extension (Jones, 1981). The link between perceived job stress and job turnover (or propensity to leave) has been widely researched and fairly well established (see for example Bedian et al., 1981; Gray-Toft, 1981a,b; Seybolt et al., 1978). Fewer studies were reported in the literature that attempted to investigate a relationship between perceived stress and increased absenteeism (Continuous observation, 1977; Gentry et al., 1972; Felt, 1982). On the basis of his review, Felt (1982) documented the major contributory factors in employee absenteeism:

- external factors (weather, distance to work);
- personal factors (personal or family illness); and
- employer-related (liberal sick benefits, low staffing combined with heavy workload, more overtime hours, boring work).

Felt opted to empirically investigate one aspect of the relationship between absenteeism and employer-related factors. He examined the effect of headnurses' leadership styles on employees' absenteeism but did not obtain significant results. On the basis of this review, it was evident that empirical investigations of the relationship between nurses' perceived job stress and their rate of absenteeism are needed.

The relationship between job stress and level of job performance has not been widely investigated but, as previously noted, the few studies that examined this area reported conflicting results (Bedian et al., 1981; Seybolt et al., 1981). Logistical considerations and the unavailability of appropriate job performance measures remain considerable hinderances to research in this area.

Psychological manifestations of nurses' environmental stress have been more widely investigated. Nurses' anxiety and levels of job satisfaction were the primary manifestations studied. Gentry et al. (1972), for example, found that ICU nurses experienced more depression, hostility, anxiety, dislikes and inter-staff conflicts than non-ICU nurses. The differences were explained in terms of stress level variation. Maloney (1982) also compared ICU and non-ICU nurses' differences with respect to anxiety, incidence of somatic complaints, and level of job satisfaction. Unexpectedly, he found evidence of greater anxiety and somatic complaints in the group of non-ICU nurses. These differences were small but significant, whereas he found no difference between the groups on the basis of job satisfaction. On further examination, Maloney and Bartz (1983) determined that both groups of nurses displayed characteristics of stress tolerant personalities, such as lack of alienation, sense of internal and external control, and spirit of adventure. This finding led them to speculate that ICU nurses received greater social support due to the special status of ICU's and this mediated their stress response. Despite Maloney's findings, generally the nursing literature supported the relationship between nurses' perceived job stress and job dissatisfaction. Often significant findings were reported but the association between the two measures were generally low to modest (Bedian et al., 1981; Cook & Mandrillo, 1982; Gray-Toft & Anderson 1981a,b; Lester & Brower, 1981; Pinnell, 1979; Seybolt et al., 1978).

In summary, reports of the stress experienced by hospital nursing employees were reviewed in this section. In the following section, the literature pertaining to the stress experienced by public health and community- based nurses were reviewed.

2.4.2 Community Health Studies

An apparent void exists in the literature with regard to empirical investigations of the sources and levels of stress experienced by public health nurses. Only rarely was a descriptive study reported, and these involved the examination of stressors experienced by hospital, community health, and mental health workers. Steinmetz, Kaplan, and Miller (1982), for example, addressed the need to develop a stress assessment tool that could be used for comparative purposes and for evaluation of the effectiveness of stress management interventions. In the attempt to validate their assessment tool, Steinmetz et al. (1982) included hospital nurses, managers, technicians, and mental health workers in their study population. Two meaningful stress factors were identified for this heterogeneous population: external organizational stressors, and internal personal stressors. The latter factor contained variables such as unrealistic expectations and low assertiveness. Unfortunately, no attempt was made to compare the various groups of respondents on the basis of their sources or levels of stress.

Most reports of public health nursing practice or its stressfulness were anecdotal or experiential accounts. Ervin (1982), for example, provided an adminstrator's perspective of the characteristics of public health nursing practice. While she did not describe it as stressful *per se*, similar stress-producing factors as were evident in hospital nursing practice were inherent in her account. Role conflicts, role ambiguity, and the need for public health nurses to adapt to radically changing priorities and circumstances were evident in her delineation. Specifically, Ervin (1982) cited the following forces as major factors impinging upon public health nursing practice:

> ...fiscal constraints, earlier hospital discharges resulting in the increased acuity of clients' illnesses, specialization in nursing where generalist practice had been the mode, increasing variety of health care workers, and changes in federal and provincial legislations that were imposed on local units.

Reilly and Legge (1981) painted a similar picture of public health nursing practice and identified two additional stressors: the expanded usage of public clinics by the medically indigent and, constituents' rising expectations of the availability of services.

Funkhouser (1976, 1977) conducted a survey through a nursing journal with the objective of obtaining nurses' ratings of the quality of care provided in their particular practice setting. Over 10,000 nurses responded, including community health nurses. The community health nurses rated their quality of care excellent or good in all areas of nursing practice and their ratings were consistently higher than those provided by nurses employed in hospitals with over 200 beds. Analysis of the responses (Funkhouser, 1977) suggested that if respondents indicated that coworkers' morale was high, then they were more inclined to give coworkers a high nursing performance rating and would be willing to be patients in their place of employment. Extrapolating from these findings, it would appear that the community health nurses who responded have a high morale and possibly were more supportive of one another. As previous studies have shown that social support and group cohesiveness moderate the stress experience, one could postulate on the basis of this indirect evidence that community health nurses experience lower levels of stress than hospital nurses. No evidence of the testing of such a relationship was found in the literature however.

The final section comprises a brief overview of the literature pertaining to stressors experienced by nurses by virtue of their socialization as women and nurses.

2.4.3 Women, Nurses, and Stress

Vachon, Lyall, and Rogers (1976) reported their experience as mental health consultants to a group of nurses employed in thanatology. Their purpose was to assist the nurses cope with the care of dying patients, but the insights they gained during the experience had broader relevance for nurse-physician relationships and women generally (p. 183). When the consultants examined the nurses' "expressed" need, they found that it masked deeper problems of intrapersonal and interpersonal conflict. They attributed these problems to the nurses' socialization during training, to the existing employment situation, and to their early childhood experiences, where girls are rewarded for good behavior, non-aggressiveness, and the establishment of successful interpersonal relationships (1976, pp. 175-176). Furthermore, they maintained that the women attracted to nursing display skills of nurturance, empathy, competence, and have a need for affiliation, succor, social control and security. When these traits are reinforced in the nursing role, they suggested that the nurse's basic tendency to avoid risks and self-exposure was enhanced.

Another source of stress for female nurses arose in the context of the employment of married nurses (Cleland, Bass, McHugh, & Montano, 1976). The researchers surveyed over 2300 nurses to determine the factors influencing married nurses' employment. The factors most associated with maintenance of employment were desiring a career, the individual's level of professional behavior (e.g., position, education, involvement in professional activities), and the economic value of employment considered greater than the value of housewife services. It was noteworthy that those nurses with the greatest flexibility regarding choice of employment (i.e., married, low financial need, no preschool children) identified 'satisfaction with nursing' as the greatest predictor of future employment status.

In examining the factors contributing to workers' degree of job satisfaction and their level of job performance, White (1973) found differences that could be explained in terms of sex. In general, he concluded that a stronger relationship existed between worker autonomy and degree of job satisfaction and productivity for female workers than for male workers. Two aspects of worker autonomy were examined. He found little relationship for work task autonomy (control over work tasks) but, for women in particular, nonwork task autonomy (control over activities during lulls in work) was positively and significantly related to worker effectiveness. These findings suggest another dimension for research into workers' stress, and women's stress in particular.

2.4.4 Summary

In summary, studies of hospital and community health nurses' stress were reviewed. Most involved hospital nurses as subjects, especially ICU and other specialty care nurses. Gradually this focus yielded to include all hospital nurses. The studies were primarily descriptive, exploratory, cross-sectional surveys that involved the use of a questionnaire. Most attempted to identify hospital nurses' major sources of work stress so as to explain the acute nursing manpower shortages that existed in the late seventies and early eighties. Few studies examined the effect of nurses' personal characteristics on their stress experiences, although some researchers identified this as an area to explore in future studies. Four predominant work stressors emerged in the studies of hospital nurses' stress:

- traditional role stress;
- traditional task stress;
- lack of role fulfillment; and
- nonparticipation in decision-making.

A few studies attempted to examine hospital nurses' stress manifestations. They generally found that job stress was associated with job turnover, job dissatisfaction, burnout symptoms, and anxiety. Very few empirical investigations of community health nurses' stress were reported, suggesting that their stress has not been as evident as hospital nurses'. The relationship of nurses' stress to the nature of a female-dominated occupation was also examined and found to influence their stress perceptions.

2.5 Research Methods in the Study of Stress

The research methods used in stress studies and measurement issues relevant to the construct are discussed below in order to provide background information for interpreting study results. Three methodological concerns will be discussed: study design, reliability and validity issues, and the issue of causality.

2.5.1 Study Design

Reports of stress investigations involving the use of experimental designs are infrequent in the socio-psychological and nursing stress literature. Given the logistical and ethical difficulties associated with the use of experimental designs, their rarity is not unexpected. A rare experimental study involving human subjects was reported by Froberg, Karlsson, Levi, Lidberg, & Seeman (1969).

The majority of stress studies involved descriptive and exploratory survey designs and the most frequent data collection technique was by mail questionnaire. Several longitudinal studies were identified that involved the investigation of the stress experienced by subjects while in their natural setting (Froberg et al., 1969; Mechanic, 1962;

McGrath, 1976; Rahe et al., 1972). The time period in each investigation and the number of subjects followed varied considerably however. Froberg et al. (1969), for example, studied twelve invoicing clerks over four days, Mechanic (1962) studied graduate students' stress during the several months they spent preparing for exams, while McGrath (1976) observed the stress experience of sixty little league baseball players for an entire season. The largest longitudinal study was that conducted by Rahe et al. (1972). They documented the incidence of illness reporting of approximately 4,450 U.S. navy personnel over an eight month period. As noted by McGrath (1976), advantages and disadvantages accrue to the measure of stress in natural settings. Foremost among the advantages is the opportunity to study behavior under realistic conditions and to avoid the issue of artificiality. On the other hand, since individuals select, develop, shape or cope with situational demands in their natural setting, the potential for high levels of stress exists but they may not always be observed during the study period.

As most of the cross-sectional surveys relied on a mail questionnaire as their stress measurement device, much of the evidence in the stress literature was based on studies using only a single index of stress. Consequently, the value of such evidence is necessarily weak as it is impossible to assess artifact due to the specific measurement technique, such as method dependence of the results (Blau, 1981;

McGrath, 1976).

2.5.2 Reliability and Validity Issues

In stress research, unless the reliability of questionnaire responses can be assured and the validity of stress measures can be established, generalizations of findings must be limited. However, the determination of reliability and construct validity, in particular, is difficult. The assessment of the degree of reliability was of concern to many researchers and, when reported, most researchers obtained highly reliable responses on the basis of two methods of reliability testing: repeated measures, and the internal consistency of questionnaire responses. Gray-Tofts and Anderson (1981a), for example, estimated the degree of reliability of their Nursing Stress Scale by the test-retest and internal consistency methods. The test-retest coefficient for the scale was 0.81 and their four measures of internal consistency were all 0.79 or greater. Since they conceptualized stress as a multifactorial concept, a high estimate of internal consistency appears contradictory. While not directly contradicting their assumption, the results could be interpreted as indicating that their instrument was dependably measuring a general factor of work stress comprised of internally consistent component parts.

Estimations of the degree of validity were noticably absent from much of the socio-psychological literature and most of the nursing stress literature. Gray-Tofts and

Anderson (1981a,b) were an exception. If validity was discussed, most researchers restricted their reports to the assessment of face and content validity estimates (Huckabay and Jagla, 1979; Ilfeld, 1976).

2.5.3 The Issue of Causality

Most of the studies reviewed relied heavily on correlational measures for their conclusions. Consequently, limited inferences about causality could be drawn. Furthermore, correlational analyses fail to account for the role of intervening variables and processes. As depicted in McGrath's (1976) conceptual model, intervening variables and processes are critical elements in the stress process; thus the causal chain is more than two variables long as many investigators suggested (Cooper & Marshall, 1976).

Another impediment to causality determination is the reliance by researchers on cross-sectional studies. As temporal relationships are difficult to establish, it is impossible to determine whether the supposed stress manifestations preceded or followed the stress experience (Cummings & Cooper, 1979). Furthermore, as noted by Maloney and Bartz (1983), workers, such as nurses, with specific traits and physiological conditions, self-select their areas of employment thus confounding the investigation of their stress experience. It is feasible, for instance, that highly anxious individuals desire ICU nursing employment thus making it appear that ICU employment *causes* stress and anxiety. As most correlational data generally provided evidence of low to moderate associations, this attests to the complex causation of behavior. No studies that resolved this consideration were identified in the literature review.

2.6 Summary of Literature Review

The literature review showed that multiple, conflicting stress definitions have impeded the development of an adequate stress theory as the interpretation and inter-study comparison of empirical findings have been restricted. A transactional definition was selected for use in this study because it incorporated realistic, dynamic personal and environmental interactions in the stress process. The stress process was initiated when an environmental situation required a coping action or behavior by the focal person. If the situation could not be left unattended, or exceeded usual coping abilities, stress was experienced. Subsequently, the individual reacted to stress with characteristic stress manifestations. The literature pertaining to potential environmental stressors is summarized in the following subsection.

Potential Stressors

1. Environmental Stressors

It appears that the following environmental stressors were associated with job stress:

- task difficulty, ambiguity, and load
- the nature of the task, such as meeting the emotional

needs of sick and dying patients and responsibility for people

- role conflicts and ambiguity
- a lack of job fulfillment and nonparticipation in decisions affecting work
- inadequate interpersonal relationships, especially low co-worker trust and supportiveness
- life events, especially negative events such as financial crises or excessive family responsibilities.

2. Socio-demographic Characteristics

The following socio-demographic characteristics of nurses were found to influence their appraisal of stressors:

- the existence of social support, especially from family members and friends
- age
- level of education
- years of experience and job tenure

The literature review showed that most approaches to the measure of stress involved a cross-sectional survey using a questionnaire for data collection. Many questionnaires were located in the literature but few researchers reported an assessment of questionnaire reliability or validity. Furthermore, most studies attempted to investigate work stressors and disregarded potential stressors in the home and social environments. The nursing studies tended to examine hospital nurses' work stressors and few considered other stress sources, or the stress experienced by nurses employed in other work settings.

In conclusion, the literature review indicated a number of considerations that were important to incorporate into the study design. In the following chapter, the methodology used in this study is outlined.

3. METHODOLOGY

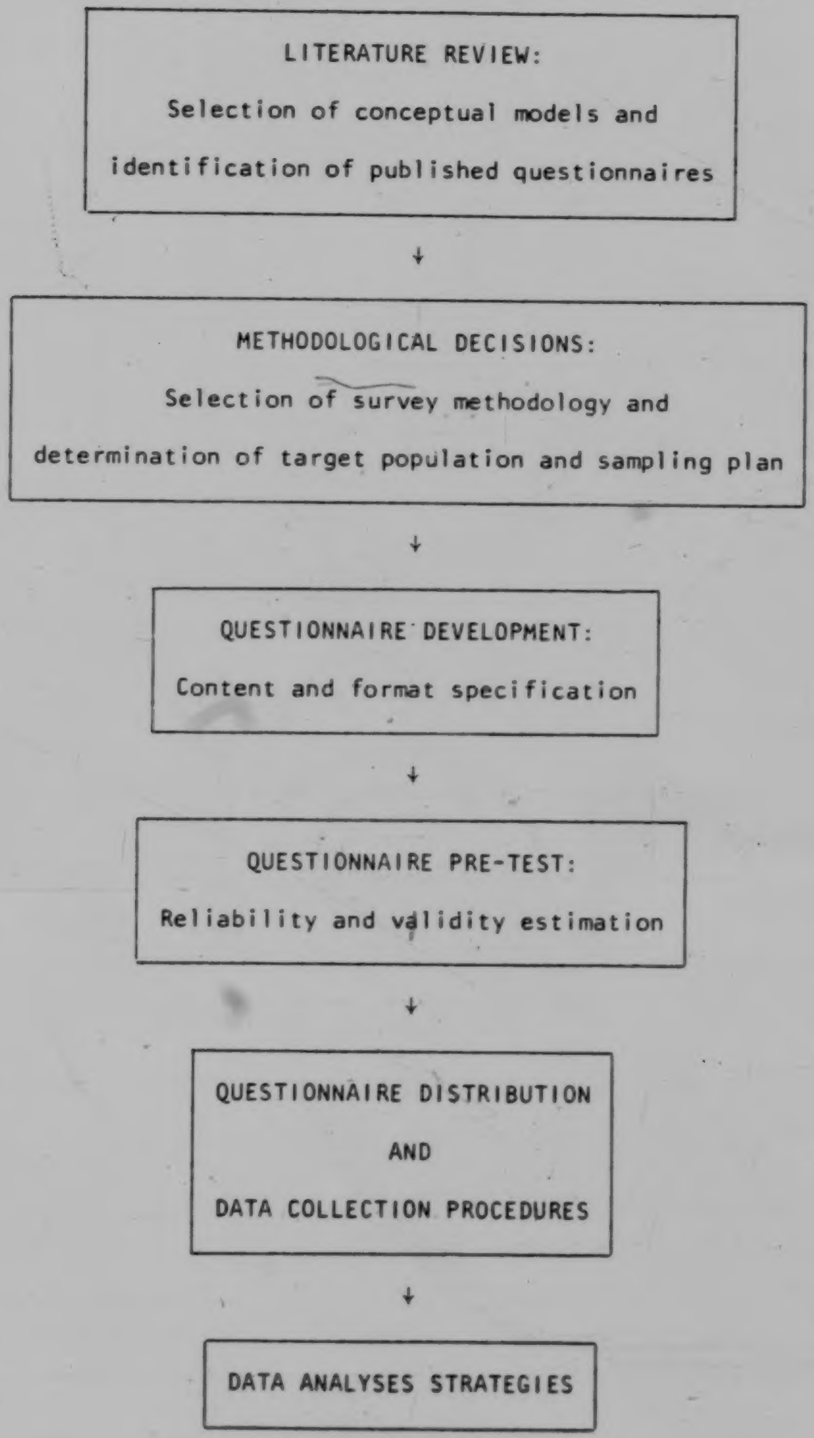
In this chapter, the formulation and implementation of the study methodology are delineated through discussions of the following four components: 1) the research strategy, 2) questionnaire development and pretest, 3) questionnaire distribution and data collection procedures, and 4) the data analysis strategies.

3.1 Research Strategy

The literature review revealed that many nursing stress studies focussed on the identification of hospital nurses' work stressors without regard for the determination of potential nonwork stressors. Furthermore, it was evident that few investigators had attempted to study nonhospital-based nurses' stress and no studies were identified whose primary purpose was to compare the stress experienced by nurses employed in various occupational settings. These research voids provided an impetus for this study and were the basis upon which study objectives were established. Consequently, the measurement and comparison of Alberta nurses' sources and levels of environmental stress constituted the primary objective in the study. Several steps were employed in order to facilitate the development of a research strategy to meet this objective (see Figure 2). These steps are discussed in this and following sections.

FIGURE 2

Research Strategy


LITERATURE REVIEW:
Selection of conceptual models and
identification of published questionnaires
METHODOLOGICAL DECISIONS:
Selection of survey methodology and
determination of target population and sampling plan
QUESTIONNAIRE DEVELOPMENT:
Content and format specification
QUESTIONNAIRE PRE-TEST:
Reliability and validity estimation
QUESTIONNAIRE DISTRIBUTION
AND
DATA COLLECTION PROCEDURES
DATA ANALYSES STRATEGIES

The initial step involved an indepth review of pertinent literature in order to examine stress theories and, in particular, the evidence pertaining to environmental stressors and stress outcomes. Following completion of the literature review, the limited theoretical stance of the construct was identified. Not only was there little agreement regarding the mechanisms by which stress develops, but it was evident that stress theory had not progressed to the point where causal relationships could be readily hypothesized or tested. Consequently, the consideration of research methodologies suitable for use in measuring nurses' stress was restricted.

3.1.1 Experimental Design and Confirmatory Study Approach

An experimental research design was considered ideal for testing stress theories and for the determination of causal relationships; however, such an approach was not feasible in this thesis. As previously discussed, the inadequate nature of the stress theory precluded the use of a confirmatory approach and, furthermore, the logistics of conducting an experimental study exceeded the scope of the study. Ethical considerations are involved when using human subjects, and the difficulties associated with obtaining appropriate subjects and the time and financial resources required for an experiment were several of the logistical considerations that prevented the use of an experimental design. An exploratory and descriptive approach was considered more appropriate and feasible, thus the decision was made to survey nurses in the field regarding their sources and levels of stress.

3.1.2 Survey and Exploratory Approach

A survey would yield insights rather than definitive answers into the nurses' stress because only exploration of association rather than causality are possible with a cross-sectional survey. The measurement of nurses' stress by a survey is constrained, however, by the nature of the construct which restricts the determination of the reliability and validity of stress measurements. As previously noted, stress is a complex, multi-factorial construct that defies straightforward definition. Consequently, its associated measurement difficulty necessarily limits the generalizability of survey findings. Despite the inherent problems in the measurement of nurses' stress, the use of an exploratory and descriptive approach was considered the only feasible approach within the scope of the study. Having therefore decided upon a survey research methodology, the second research step involved the selection of the specific data collection methodology.

3.1.3 Data Collection Method

The following three data collection methodologies were considered for use in the study: personal interview, telephone survey, and mail survey. Each have merits and disadvantages which will be briefly reviewed. Of the three methods, *personal interviews* generally yield the highest response rates, the most complete responses, but entail a higher risk of respondent and interviewer bias. This is because respondents are more inclined to present themselves in a favorable light when face to face with an interviewer, and interviewers, if not adequately trained, may interpret survey questions and responses nonobjectively. Personal interviews are also the most costly and time-consuming to conduct and therefore are limited generally in their respondent and geographical coverage. *Telephone surveys*, in contrast, are more economical to conduct because they permit rapid coverage of more respondents in a wider geographical area and also tend to yield high response rates. Like the personal interview, however, telephone respondents tend to present themselves in a favorable light. In contrast, respondents to a *mail survey* have more confidence in their anonymity and are therefore more inclined to freely express their opinion. Personal interviews and telephone surveys usually require the training and supervision of interviewers which entails more administrative skill, time, and money. Furthermore, both methods are subject to the risks of invasion of privacy and communication difficulties, although the personal interview situation offers more opportunity for sensitivity to respondent misunderstanding. Telephone surveys, therefore, are restricted in the number of items that can be included and in the types of responses that can be elicited. Generally, telephone surveys are limited to extremely simple, categorical types of responses in order to maintain respondent cooperation and to lesson the chance of communication problems. This feature of a telephone survey makes it particularly unsuitable to the objective of this study which was to explore the nature of nurses' stress. Consequently, a *mail survey* was selected because it offered the most feasible and economical approach, permitting extensive coverage of a large number of respondents within a reasonable time period. Furthermore, the use of a mail questionnaire ensured fairly uniform data collection while providing respondents with less pressure for immediate response. There are few mechanisms, however, to control who completes the questionnaire and the overall response rate. These disadvantages of a mail survey required specific measures (which will be discussed in subsequent sections) to promote respondent cooperation. Self-administered questionnaires also pose difficulties in relation to respondents' interpretation of items, as they assume that respondents respond to the question in the sense intended by the investigator. Careful presentation of items and the selection of content appropriate to the level of information available to the respondent were two of several measures intended to alleviate these inherent difficulties.

3.1.4 Target and Study Population

Following the decision to survey nurses regarding their stress, the next decision involved the determination of the target population and the sampling plan. The ideal design was a probability sample of the target population, defined for this study as all practising registered nurses in Alberta. Probability sampling was desirable because it permits generalization of findings from the sample to the universe, population parameters can be inferred, and the margin of uncertainty (i.e., standard error) can be estimated. However, due to resource restrictions (e.g., time, money), and the difficulty of gaining access to nurses willing to participate in the study, the target population was restricted to those nurses employed in two settings, the acute care hospital and the public health sector. Furthermore, geographic coverage of these two sectors was necessarily limited to two urban settings due to similar problems of resource restriction and access as discussed above.

3.1.5 Sampling Design

The previous discussion identified the logistical considerations that precluded the use of a probability sample. Furthermore, it provided the rational for the selection of the study sample on the basis of the investigator's judgment and subjective opinion of the appropriate nurses to include. While not ideal, such an approach was dictated by practicalities and resource limitations. In addition, it had the advantage of increasing the target population's participation rate if the project were approved by senior nursing administrators. Furthermore, judgemental sampling was appropriate for pilot testing a nursing stress questionnaire as it permitted selection of a wide variety of respondents in order to test the broad applicability of questionnaire items designed for use by nurses employed in diverse settings. Thus, the objectives of the study were met by the above considerations.

3.1.6 Sampling Plans

Different sampling plans were employed in each of the three participating agencies in order to obtain large but comparable sample sizes. They are delineated as follows:

- One hospital employed more nurses that satisfied the four selection criteria thus permitting selection of respondents. Nurses working in the following nursing units were targeted for inclusion in the study: medicine, general surgery, pulmonary, neuro and cardiovascular surgery, ICU, paediatrics, psychiatry, obstetrics (including newborn nursery and caseroom), gynecology, orthopedics, and emergency. The greater number of available nurses permitted systematic sampling of every other nurse on the sampling frame provided by this hospital.
- The second hospital employed a smaller number of nurses

who satisfied the four selection criteria specified in Section 3.3.1. Consequently, it was necessary to select nurses from every unit at this hospital.

- The public health agency employed relatively fewer nurses and therefore all of the nurses who satisfied the selection criteria were included in the target population.

Once the decision was made to survey Alberta acute care hospital and public health nurses regarding their sources and levels of environmental stress, the next step involved the selection of an appropriate survey questionnaire. In the following sections, the steps taken in questionnaire development and distribution are discussed.

3.2 Questionnaire Development

Following completion of the literature review, several published stress questionnaires were identified for possible use in this study (See Arcand, 1980; Gray-Toft & Anderson, 1981a; Huckabay & Jagla, 1979;. Pinnell, 1979; Yamashita, 1981). However, none was considered entirely suitable for several reasons. First, largely due to the difficulties associated with the measurement of stress, no fully reliable and valid instruments were reported in the literature. Second, several of the existing questionnaires were developed from a conceptual framework of stress that, while similar to that selected for use in the study, failed to incorporate potential nonwork stressors. Finally, all of the instruments were designed for exclusive use by hospital nurses and thus did not fit this study design. For these reasons, the decision was made to modify the available, published questionnaires in order to attempt to improve upon their identified deficiencies. The steps taken in the development of the instrument are delineated in the following subsection.

3.2.1 Identification of Content

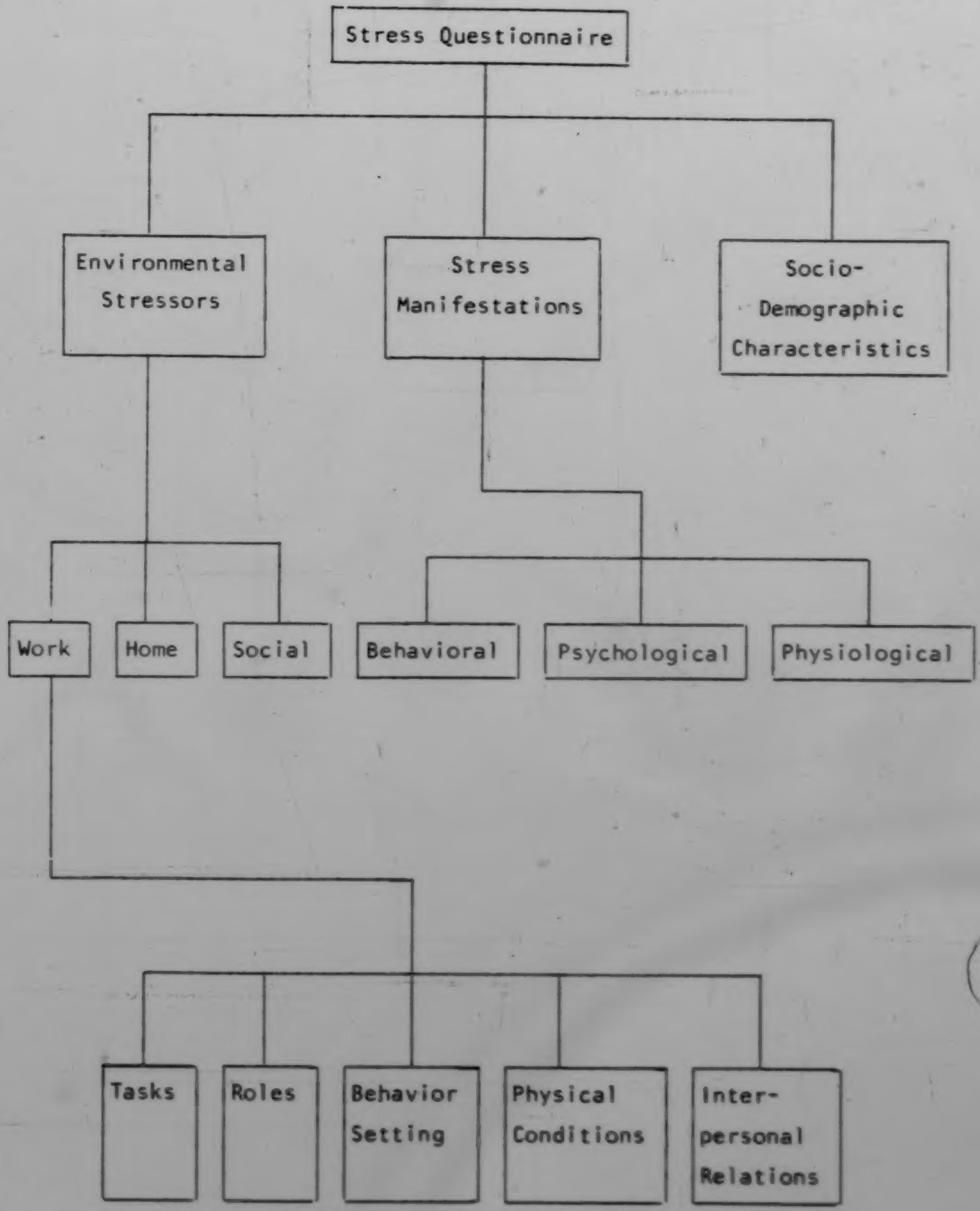
Based upon the results of the literature review and the selected conceptual model of the stress process, three major content areas were defined for the tripartite questionnaire as depicted in Figure 3. The major components included items attempting to measure potential environmental stressors, possible stress manifestations, and items pertaining to the nurses' socio-demographic characteristics. Potential questionnaire items were developed for each of these three sections by modifying items from existing published questionnaires, and by developing new items in the areas where the existing instruments were deficient or had inappropriate items.

Environmental Stressors

As shown in Figure 3, the questionnaire items pertaining to environmental stressors were further sub-categorized into work, home, and social stressors. The work stressors were then further sub-divided into the five areas of potential occupational stress as proposed in the

FIGURE 3

Organization of Questionnaire Content


Stress Questionnaire
Environmental Stressors
Stress Manifestations
Socio-Demographic Characteristics
Work
Home
Social
Behavioral
Psychological
Physiological
Tasks
Roles
Behavior Setting
Physical Conditions
Inter-personal Relations

conceptual framework adopted for use in this study (see Chapter 2, Section 2.3.1).

Stress Manifestations

Possible stress manifestations were further sub-divided into the major categories of stress response identified during the literature review: behavioral, psychological, and physiological strains. As the logistics of obtaining adequate physiological stress measurements were impractical for this thesis, questionnaire items were limited to self-reports of mainly behavioral and psychological strains. The findings of nursing and occupational stress studies were used extensively in this section in order to identify appropriate questionnaire content. Furthermore, in developing the items, care was taken to protect respondents' privacy and to avoid asking embarrassing questions.

Socio-demographic Characteristics

Items developed for possible inclusion in the final section of the questionnaire were derived from the results of nursing and occupational stress studies. In particular, the studies that demonstrated significant differences in stress score variation attributable to differences in respondents' years of experience, education, clinical specialty, and age, were consulted extensively (Anderson & Basteyens, 1981; Arcand, 1980; Gray-Toft & Anderson, 1981a; Huckabay & Jagla, 1979; Pinnell, 1979). As noted in the preceding section, sensitivity regarding the respondents' rights for privacy was maintained in developing items for this component of the questionnaire.

3.2.2 Questionnaire Format

The attractiveness and clarity of questionnaire format, the ease of completing it, and the questionnaire length are factors known to affect the response rate to a mail survey (Berdie & Anderson, 1974; Selltiz, Wrightsman, & Cook, 1976, p. 297). These factors were considered during the development of the questionnaire format.

Environmental Stressors

Approximately 100 potentially stressful environmental variables were identified for possible inclusion in the first part of the draft questionnaire. Each item was presented as a close-ended, single-idea statement. The respondent was asked to indicate whether or not the situation was perceived as stress-producing and if so, to indicate the degree of stress experienced. The response alternatives were simplified such that one set of responses applied to all potential stressors. The response alternatives comprised a four-point Likert-type scheme, specifically: 1) no stress, 2) yes little, 3) yes moderate, and 4) yes great stress. Responses were coded using an ordinal scale, such that "no stress" was assigned zero and "great stress" was assigned a scale of three.

From the pool of possible questionnaire items, it was necessary to select items to be retained in the draft questionnaire (see Appendix A). The specific procedure used is the subject of the following section. Once items were selected, however, items were ordered throughout the first section of the questionnaire on the basis of the investigator's judgment of their difficulty in providing responses. This was done in an effort to maintain respondent cooperation.

Stress Manifestations

Five items considered by the investigator to be representative of possible stress manifestations were developed for the second part of the questionnaire. The items were structured so as to minimize respondent effort. Thus, for example, instructions were provided to omit non-applicable items and the response effort consisted of a simple checking of the appropriate response.

Socio-demographic Characteristics

The final section consisted of stress-related, socio-demographic questions that were simplified as previously so as to minimize respondent effort. An attempt was made to provide response alternatives that were exhaustive and inclusive of all possible responses as much as was possible.

Several attempts were made to reduce the possibility of systematic or other measurement errors. These included the use of neutral phraseology in all questionnaire items, the provision to respondents of a single definition of stress, directions specifying a common mind set from which to respond to each item, the assurance of anonymity, an invitation to participate voluntarily, the assurance that minimal time was required for questionnaire completion, and the provision of a stamped return envelope to ensure ease of replying.

In summary, questionnaire development was discussed in terms of the identification of its content and its structure. The steps taken to select the questionnaire content and to conduct the questionnaire pretest are discussed next.

3.2.3 Selection of Questionnaire Items

Items were selected for inclusion in the draft questionnaire (see Appendix A) on the basis of the investigator's judgment following consideration of factors known to affect questionnaire response rates and measurement of a construct:

- an adequate sample of all the possible contents which might comprise the multidimensional trait;
- content represented in proportion to its life importance (Loevenger, 1957, p. 659);
- a reasonable number of items that can be administered to nurses without causing them "stress"; and
- unambiguous, simple language and structure (Berdie & Anderson,1974, pp. 36 - 48).

The criteria by which questionnaire items were retained included acceptable levels of face and content validity, determined through the use of a pretest. These concepts are the subject of the following section.

3.2.4 Questionnaire Pretest

The draft questionnaire represented a modification of existing stress measurement instruments; therefore, its reliability and validity were unknown. A thorough ascertainment of its level of reliability and validity was beyond the scope of this study but the steps taken to estimate preliminary forms of both parameters are delineated in this section. The process of questionnaire reliability estimation is discussed prior to that of validity assessment because reliability is a precondition to the establishment of measurement validity.

Estimation of Reliability

Instrument reliability can be investigated from several perspectives, including estimation of the dependability or stability of measurements on repeated administrations, and assessment of the internal consistency of items that attempt to measure the same attribute or construct. Given the ambiguous and perceptual nature of the stress process, perceived stress was expected to change over time. Consequently, it was inappropriate to attempt to estimate the questionnaire's reliability on repeated administrations; rather, the internal consistency of its items was of concern. However, as stress was conceptualized as a multi-factorial construct, it was appropriate to assess the reliability of only the variables highly associated with each inherent stress factor. Consequently, reliability estimation followed the determination of the stress factors and subscales.

A reliability (Cronbach's alpha), (Hull & Haddie, 1981, p. 256) coefficient was determined for each subscale by computing all possible split-half correlations of the variables comprising each subscale, and obtaining their average. This model was appropriate for use in this study as it accommodated scales composed of varying numbers of variables. As it was assumed that highly loaded questionnaire variables in each stress subscale measured the same trait, *a priori*, a relatively high degree of reliability, or internal consistency, was expected for each subscale.

Determination of Face Validity

An attempt was made to secure the face validity of questionnaire items in two ways: 1) by assessing the comments of pre-test respondents and other individuals who examined the questionnaire prior to its use in the survey, and 2) use of the literature review results. The steps employed in the process of face validity assessment follow.

1. Face Validity Assessment of Draft Questionnaire:

Four nurses from each of two target agencies, one hospital and the public health agency, were selected to participate in the pre-test of the draft questionnaire. They were selected so as to be broadly representative of the population of nurses from which the survey samples were drawn. Each nurse was asked to report the length of time required to complete the questionnaire, and to evaluate the length, clarity of meaning, and appropriateness of the questionnaire content. Suggestions for additional content or comments were invited (see Appendix B). Based on their feedback, revisions were planned if weaknesses or shortcomings were identified. This approach to face validity assessment was limited to a small number of validators and, due to time constraints, coincided with the content validity evaluation. It was recognized therefore that possible content revisions would necessitate further attempts to evaluate face validity.

2. Face Validity Assessment of Revised Questionnaire:

Content revisions of the draft questionnaire necessitated a second attempt to secure the face validity of the revised questionnaire (see Appendices B and C). Two nurses from the other participating hospital were selected to examine the questionnaire prior to its distribution. They were asked to evaluate it using the same criteria as outlined above. As noted previously, their feedback was considered in the determination of possible content revisions.

3. Face Validity Assessment by Administrators:

Potential users of the questionnaire (e.g., a personnel officer and a nursing administrator) were invited informally to assess the revised questionnaire's relevance to nurses employed in the hospital and community settings, and the clarity of meaning of questionnaire items and directions. It was planned that their suggestions would be incorporated into content revisions as appropriate.

Determination of Content Validity

Six individuals deemed by the investigator to be representative of stress "content experts" were invited to evaluate independently the questionnaire prior to its use in the survey. In order to ensure a broad perspective of expert opinion, two content validators were selected from each of the following fields: medical sociology, clinical psychology, and nursing administration. Furthermore, the nursing administrators were selected so as to ensure representation of hospital and community health nursing. Constraints of time and expert availability restricted the number of content validators used. *A priori* to the assessment by the "content experts", it was established arbitrarily that five of the six validators must agree in order for the inclusion or exclusion of any questionnaire item (Hazlett, 1975).

The content validators were requested to evaluate the questionnaire content to ensure that the following criteria were met (see Appendix B):

- each item was relevant to the construct;
- the meaning of each item was clear; and
- the selection of questionnaire items formed a representative sample of the possible items that comprise the putative trait.

Consideration was given to the possibility of content revisions following the "expert's" evaluation; therefore further iterations of the validation process were planned until the standard of acceptability, that is, five of six experts in agreement, was met.

3.2.5 Results of Questionnaire Pretest

The results of the steps employed to assess the questionnaire's face and content validity are presented below.

Face Validity Assessment: Draft Questionnaire

Seven nurses (three hospital and four community nurses) participated in the pretest of the draft questionnaire. Five of them required fifteen minutes on average to complete the questionnaire and found this to be reasonable. Two nurses, however, needed twenty-five minutes and stated that this time requirement was too long. The average questionnaire completion time for the sample of seven nurses was eighteen minutes. This exceeded the desired time limit of fifteen minutes, considered optimal to maintain respondent compliance without inducing fatigue. Consequently, attempts were made to streamline questionnaire length during content revisions.

The seven pretest respondents identified several questionnaire items that were unclear in their meaning. In particular, the second questionnaire item, pertaining to a compressed work week, was identified. Fewer comments were made regarding the appropriateness of the content, although the community nurses identified the second questionnaire item as inappropriate content. Their concern with this particular item reflects the challenge of developing content acceptable to nurses employed in divergent work settings. The variable was eliminated subsequently from the revised questionnaire.

The request for additional questionnaire items elicited several suggestions, including recommendations to add the following variables: staffing levels, travel, lack of help to cope with personal problems, and limited communication between staff nurses and senior administrators. The evaluations provided by the seven face validators were compared with the assessments provided by the content experts. If similar judgments were provided, the item in question was either eliminated or modified in the revised questionnaire.

Face Validity Assessment: Revised Questionnaire

Two additional nurses (from the other participating hospital) and several nursing administrative officers examined the revised questionnaire (see Appendix C). As they provided no suggestions for change, the revised questionnaire was considered to have an acceptable level of face validity.

Content Validity Assessment: Draft Questionnaire

Six content experts independently evaluated the draft questionnaire and then their judgments were reviewed by the investigator. Applying the criterion of item acceptability or rejection, several questionnaire items were eliminated as five of the six experts judged them to be either unrelated to the construct or unclear in their wording. In both instances, therefore, the variables in question were judged to provide inadequate measures of the construct. In addition to the content experts' evaluation of the relevance and clarity of each variable, they identified several content voids. Three of them stated that the collection of questionnaire items did not comprise a representative sample of possible stress variables and thus was invalid.

In summary, the experts' assessment of the draft questionnaire indicated that some items were inappropriately worded and therefore could not be expected to provide accurate measures of nurses' stress. Furthermore, the overall collection of questionnaire items was not representative of nurses' potential stressors or stress responses. Consequently, these inherent sources of content invalidity necessitated revisions to the draft questionnaire and a subsequent evaluation of the revised questionnaire's content validity.

Content Validity Assessment: Revised Questionnaire

Due to the growing imposition on the content experts' time, only four of the original six experts were asked to evaluate the content of the revised questionnaire. Relatively minor wording changes were recommended following their review. Consequently, this result indicated that the revised questionnaire was developed in such a way that an adequate level of content validity was present.

3.3 Questionnaire Distribution and Data Collection Procedures

The steps involved in questionnaire distribution and the data collection procedures are delineated in the following sections.

3.3.1 Selection of Respondents

Four urban health care agencies (two hospitals and two public health departments) in Alberta were invited to participate in the study. The selection of these particular agencies occurred for several reasons. Of prime consideration was the desire to measure the stress levels of nurses employed in divergent settings. This would facilitate the development of a nursing stress scale that was not agency-dependent and would permit testing of the appropriateness of its use in inter-agency comparisons. Logistical considerations of time, investigator convenience, and an agency's willingness to cooperate were other factors that entered into the decision to select these particular agencies. Furthermore, the selection of public health agencies addressed a void in the nursing stress literature, specifically the lack of reported evidence suggesting or refuting the existence of stress in community health nurses. Following the agencies' ethical reviews of the research proposal, both hospitals and one public health department agreed to participate in the study.

A target population was identified in each agency utilizing the following selection criteria:

- minimum educational preparation of registered nurse diploma;
- current position was held for six months or longer;
- full-time nursing employee; and
- non-supervisory position with major responsibilites defined as direct patient or client care.

The distribution of nurses over various sub-population variables (e.g., marital status; educational level) was unknown in advance of the mail survey. Consequently, generous allocation of sample size was required to ensure that the specific number of cases in each category of these variables was obtained in order to obtain stable estimates of parameters. It was hoped that nurses could be selected from similar nursing units in both hospitals in order to facilitate comparisons. This goal was impossible to attain, however, because one hospital employed more parttime nurses than the other. There was also some concern that insufficient numbers of nurses could be identified, if all four target criteria were to be satisfied. Therefore, nurses were selected from all nursing units at this hospital. The selection goal was to obtain as large a number of nursing respondents as possible, for two reasons that were related to the intended uses of the data. One intended use of the data was to compare the mean stress levels of different groups of nurses. When stress data are used at the aggregate level, nonsystematic errors tend to be cancelled out if the sample size is large. Therefore questionnaire reliability was not considered as crucial as the securing of unbiased estimates of the nurses' stress levels, since they produce consistent estimates on repeated testings. The second possible use of the questionnaire was at the level of the individual. An example of an individual application is the use of the stress questionnaire for career counselling. In this instance, the reliability of the stress estimate is extremely crucial because there is no advantageous use of the group mean to average out nonsystematic errors. However, as the main purpose of this study was to compare the stress scores of groups of nurses, questionnaire reliability was less critical.

3.3.2 Questionnaire Distribution

Survey questionnaires were distributed in late May 1983 with each nurse's pay envelope. As pay cycles differed in each agency, questionnaire distribution occurred over a two week period. Each nurse received an envelope containing the questionnaire, a covering letter, and a pre-stamped business-reply envelope (see Appendix D). The nurses employed at the hospital that provided the investigator with a sampling frame received, in addition, a reply card (used in followup procedures). They were instructed to return it separately from the questionnaire in order to maintain anonymity.

3.3.3 Followup Procedures

One prompting of non-respondents was attempted approximately one month following the initial distribution of the survey questionnaire (see Appendix D). In only one agency was the sampling frame available to the investigator thus permitting more exact followup procedures. The specific procedures varied in each agency because of this and because, in the other agencies, a convenient master frame was unavailable. The specific followup procedures employed at each agency are delineated below.

1. Hospital With Convenient Frame:

The names of respondents who completed the reply card were excluded from the sampling frame; all others at this particular hospital received a followup letter and a second questionnaire.

2. Second Hospital:

All of the nurses received a second package containing the followup letter, a questionnaire, and return envelope.

3. Public Health Agency:

A poster reminding the nurses to complete the questionnaire was displayed in each of the clinics where the nurses were employed.

Non-respondents were given an additional month and a half in which to respond and then, three months after the initial mail distribution, no further responses were included in the data analysis.

3.4 Data Analysis Strategies

In this section, the statistical methods used to obtain information required for the study objectives are delineated.

3.4.1 Descriptive Analyses

Two types of descriptive analyses were completed in order to categorize and summarize the data so that the incidence and distribution of the survey respondents' characteristics could be readily observed. The first set of analyses was a frequency analysis, done in order to simply count the number of responses in each of several categories of response alternatives. Frequency distributions were obtained for each of the following variables:

- place of employment and other socio-demographic characteristics;
- potential stressor variables;
- the number and reasons for absenteeism episodes; and
- other possible stress manifestations.

The characteristics of the respondents were examined by observing the distribution, variability, and central tendencies of the responses in each of the response categories cited above.

The second set of descriptive analyses involved the bivariate analysis of selected variables. These analyses consist of the cross-tabulation of one set of frequency distributions against another in order to facilitate subgroup comparisons and identification of association between two variables. In each crosstabulation procedure, the dependent variable was the number of absenteeism episodes. Several independent variables were selected on the assumption that they preceeded the absenteeism episodes and thus might be investigated for their association with, or their ability to predict, the dependent variable. The following variables were used as independent variables: reasons for absenteeism, place of employment, clinical specialty, level of education, age category, marital status, and number of dependents.

3.4.2 Factor Analysis of Stressor Variables

For a multivariate analysis of the stress data, factor analysis was employed to determine the underlying structure or relationships among the thirty-two stressor variables. Detection of the inherent pattern, or factors, in the nurses' stress responses would facilitate the goal of parsimony because it was hoped that the stressor variables could be rearranged or reduced to a smaller set of factors that accounted for the observed correlations among variables. Furthermore, factor analysis provided a method for ascertaining the extent to which stressor variables were related to each of the derived factors. This facility was exploited subsequently in the process of stress scale development as it permitted the selection of only the most highly related stressor variables. (The topic of scale development is discussed in a subsequent section.)

Utilizing SPSS sub-program, FACTOR (Nie et al., 1975, pp. 468 - 514), five steps were performed in order to determine the number and nature of the factors that underlie the stressor variables. These steps are delineated in the following discussions:

1. Preparation of Correlation Matrix

It was necessary to calculate the measure of association for each pair of stressor variables. Using Pearson product-moment correlation coefficients, an R-type matrix (i.e., correlations between variables) was obtained.

2. Extraction of Initial Factors

As a number of alternative methods are available to factor analyze a correlation matrix, it was necessary to select the most feasible approach. The principal factors method with iteration, that is PA2 of SPSS (Nie et al., 1975, p.478), was selected because it was available, convenient to use, and is considered by many to provide a superior factor solution (Kerlinger, 1973, p. 667; Nie et al., 1975,p. 480). Using this method, a maximum amount of variation is explained as each factor is extracted. In other words, factors are ordered by their importance such that the first factor accounts for the greatest amount of variation in the observed relationships among variables; subsequent, less important factors account for lesser amounts of the variation.

It was necessary also to determine the number of factors that could be extracted by the factor analysis. Specification of a minimum eigenvalue criterion (i.e., amount of total variation explained by a factor) of 1.0 meant that all factors with an associated eigenvalue of 1.0 or greater were automatically retained for the final rotated solution. This criterion ensured that only components accounting for at least the amount of variation of a single variable were treated as significant (Nie et al., 1975, p. 479).

3. Rotation of Factors to a Terminal Solution

Two main methods of factor rotation were considered for use in the study. The first, orthoganal rotation, maintains the independence of factors so that simple, meaningful structures are determined. Orthoganal rotations maintain the angles between factor axes at 90 degrees and thus the correlations between factors are low or zero. Of the three methods available for orthoganal rotation, varimax was selected because it usually provides the simplest factor structures (Nie et al., 1975, p.485). The second rotational method, oblique rotation, allows the factor axes to form various angles, thus permitting inter-factor correlations. As neither rotational method was more feasible than the other, nor offered theoretical advantages, both methods were employed in the study. Their results, that is the rotated terminal factor solutions, were compared in order to select the solution that attained the more meaningful factors with the simplest factor structures.

4. Interpretation of Factor Matrix

One of the final products of factor analysis is a matrix of coefficients, called factor loadings (orthogonal), or factor structure (oblique), that express numerically how much each variable is associated with a factor. The higher the factor loading, the more it reflects or measures the factor. Arbitrarily, variables with factor loadings equal to or greater than 0.40 were considered large enough to warrant inclusion in the interpretation of the derived factors (Kerlinger, 1979, p. 189). As each factor represented a hypothetical dimension of the stress data, it was necessary to assign a factor name that epitomized the essence of the variables that loaded highly on each factor. Following determination of the terminal factor solution, it was compared with the multifactorial conceptual framework employed in this study. This evaluation was performed in order to provide an estimate of the construct validity of the stressor variables that comprised the stress factors.

5. Derivation of Factor Scores

The final product of factor analysis was the derivation of a factor score value for each of the derived factors. Consequently, each nurse in the data file was assigned factor scores for each derived factor. As the scores reflected a linear combination of the thirty-two variables, no information pertaining to the stressor variables was lost, and it was possible, therefore, to summarize the stress data using fewer variables.

3.4.3 Nursing Stress Scale Development

The objective in developing the Nursing Stress Scale was to construct a set of subscales that consisted of summary measures of the thirty-two stressor variables while still retaining maximum information. Furthermore, it was desirable that the subscales were relatively straightforward to compute in order that they would be of practical utility to practising nurses.

The data-reduction capability of factor analysis was exploited in the process of scale development. Factor analysis was used to determine the underlying stress factors and to identify the variables that were most associated with each factor. Only variables with substantial factor loadings (i.e., factor loadings with an absolute value of 0.40 or greater) were employed in the process of scale construction. Consequently, for each derived stress factor, a stress sub-scale was built that consisted of only the highly loaded stressor variables. Furthermore, each case in the data file was assigned a set of subscale scores that were derived by simply summing the scores of the variables included in each subscale. Unlike the factor scores that were SPSS-generated, these sub scores were comprised of unweighted sums of a very small number of stressor variables. Consequently, some information was lost as the influence of variables not forming each subscale was excluded. Subsequent scale validational techniques were utilized to evaluate the significance of this limitation.

In summary, the Nursing Stress Scale was comprised of a set of subscales that represented the empirical dimensions associated with each derived factor. Furthermore, scores were computed for each subscale by adding the scores of variables that loaded highly on the subscale.

3.4.4 Correlational Analyses

As the subscale scores were computed somewhat arbitrarily by summing the scores of only the highly loaded variables on each stress factor, it was necessary to examine the strength of association between the two sets of stress scores, that is the factor and subscale scores. Bivariate correlation provides a single measure (i.e., correlation coefficient) that summarizes the relationship between a pair of variables. Consequently, correlation analyses were performed for each set of paired variables, that is, the derived and computed stress scores. In this way, it was possible to assess how well each computed subscale score approximated its corresponding factor score.

The SPSS sub-program, PEARSON CORR (Nie et al., 1975, pp.276 - 288) was selected for use in the bivariate analyses. Pearson's r was calculated for each pair of stress scores in order to provide information about the direction and strength of the linear relationship between the variables. It was expected in advance that a high positive linear relationship would be obtained for each stress score correlation. If the expected coefficients were obtained, it was planned that subsequent analyses would involve only the subscale scores.

3.4.5 Analysis of Stress Score Variation

A one-way analysis of variance model was utilized to assess the variability in the stress levels reported by several sub-groups of respondents. A Scheffe test (alpha=0.05) was used to test all possible linear combinations of group means (Nie et al., 1975, p.426). Two different perspectives were taken when conducting these analyses. First, an agency stance was taken in order to compare the mean stress scores of respondents at each agency. This facilitated the examination of the possible effect of place of employment and other employment variables on the survey respondents' average perceived stress levels. The second perspective involved selection of various respondent sub-groups without regard for their place of employment. Analyses conducted from this stance permitted assessment of the impact of six socio-demographic characteristics on the nurses' average perceived stress levels. Both sets of analyses are delineated in more detail in the following sections.

1. Employment Variables

The "effect" of the employment agency on a nurse's perceived stress level was assessed by comparing the mean stress scores of respondents at each agency. *A priori*, it was postulated that hospital nurses' average stress scores would be higher than those of community nurses due to the "effect" of hospital employment. Consequently, significant differences between the two hospital-based nurses' mean stress scores were unexpected. A similar analysis was conducted in order to examine if the respondents' city of employment (i.e., two major urban centres were used) had an impact on, or was associated with, the nurses' average stress levels. There was insufficient evidence to suggest the direction of any possible findings. Another set of analyses was done to compare the mean stress scores of nurses working in various clinical specialties. Conflicting evidence reported in the literature precluded the formulation of hypotheses regarding expected differences among the nurses' average stress scores due to the "effect" of clinical specialization. In all of the above sets of analyses, furthermore, it was recognized that the "effect" of nurses' self-selection to a particular agency, occupational setting, city, or clinical specialty would be to compound the "effect" of the employment variable on their perceived stress levels.

2. Socio-demographic Characteristics

Six sets of analyses were conducted to investigate the association of each socio-demographic characteristic (the independent variables) on the dependent variables (the stress scores). The following characteristics were used as independent variables: years of fulltime and parttime experience, level of education, age category, marital status, and number of dependents. Based on the results of the literature review, the following hypotheses were postulated to test the "effect" or association of each of the independent variables on the nurses' mean stress scores.

Years of Nursing Experience:

There was some literature to suggest that the longer a person remains in a job, the less occupational stress that would be experienced (Pinnell, 1979). This was tested by examining the effect of nurses' years of fulltime and part-time experience on their average stress levels. The nurses' actual numbers of years were recoded into ranges of experience (see Section 3.4.6) and the effect of both types of employment were examined separately. *A priori*, it was expected that the most experienced nurses would report lower levels of stress than their less experienced counterparts.

Level of Education:

Additional educational preparation was expected to provide the individual nurse with coping skills that would attenuate the stress experience. On the basis of their responses, the nurses were grouped into three categories of educational attainment: R.N. Diploma; R.N. Diploma plus additional courses; and Baccelaureate degree. It was postulated that the nurses with advanced preparation would have, on average, lower stress scores relative to those nurses prepared at the diploma level (Anderson & Bastyns, 1981; Arcand, 1980; Huckabay & Jagla, 1979; Pinnell, 1979).

Age Category:

The impact of age on the nurses' stress scores was assessed by testing for differences in the mean stress scores of nurses in each of the four age categories. Some evidence (Arcand, 1980; Pinnell, 1979) existed to suggest that age affected a nurse's perception of various sources of stress. This was examined by testing for significant differences in the nurses' mean stress scores according to age category.

Marital Status:

Some evidence was reported in the literature to suggest that greater social support reduced stress levels. Assuming that differences in marital status were proxies for differences in the degree of support one received, and that married nurses received the most social support, it was postulated that married nurses would report, on average, lower stress levels relative to the non-married nurses.

Number of Dependents:

It was further presupposed that the existence of dependents contributed to role stress and therefore differences in the nurses' number of dependents would affect their average stress levels.

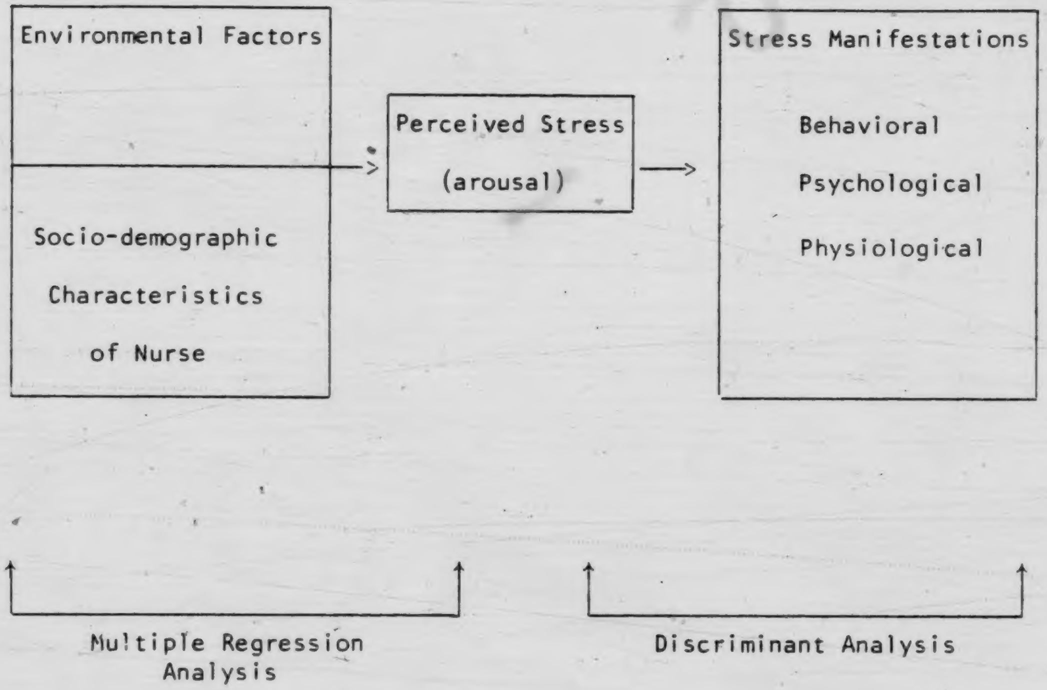
In summary, the evidence related to the construct suggested that nurses in the following categories would experience higher levels of stress on average: hospital nurses with little experience, minimal educational preparation, between the ages of 20 and 29, unmarried, and with dependents.

3.4.6 Multivariate Analysis of Stress

Examination of the theoretical model of stress used for data analysis (see Figure 4) reveals that "perceived stress" or "arousal" was considered an intervening variable. In the first part of the stress cycle, selected environmental and socio-demographic factors were conceptualized as contributing to or "causing" nurses' perceptions of stress. In this situation, "perceived stress" was considered the dependent variable, and the environmental and socio-demographic factors were regarded as independent variables that explained variability in the nurses' perceptions of stress. Multiple regression analysis was used to examine this aspect of the stress cycle and is discussed in more detail shortly. The latter half of the stress cycle involved the conceptualization of stress as a precondition or precursor of nurses' possible stress manifestations. In this case, "perceived stress levels" were treated as independent variables, which in effect "caused" or were associated with the nurses' subsequent stress responses. The responses could be behavioral, psychological, or physiological in nature. This phase of the stress cycle was investigated through the use of discriminant analysis. Both the discriminant analysis

FIGURE 4

Conceptual Model Used for Data Analysis


Environmental Factors
Socio-demographic Characteristics of Nurse
Perceived Stress (arousal)
Stress Manifestations
Behavioral
Psychological
Physiological
Multiple Regression Analysis
Discriminant Analysis

and regression models were particularly suitable to the study of nurses' stress as they embody a multivariate approach. They are discussed in detail, beginning with a delineation of the multiple regression analyses conducted in this study.

Multiple Regression Analyses

As previously noted, it was possible to evaluate the conceptual model of stress using several multiple regression analyses to assess the relationship between the nurses' "perceived stress levels" (the dependent variable) and their environmental and socio-demographic characteristics (the independent variables). The application of multiple regression techniques involved the determination of a linear prediction equation that indicated how scores on the independent variables could be weighted and summed to obtain the best possible explanation of the nurses' perceived stress levels with the least amount of residuals or errors. Consequently, the objective of the multiple regression analysis was to explain the nurses' perceived stress levels in terms of the influence or association of the independent variables.

The dependent variable (the nurses' perceived stress level) was measured using the subscale scores. Thus, eight dependent variables were available for each case in the data file. Consequently, several regression analyses were required to assess the contribution of the independent variables to variation in each dependent variable. In this way, it was possible to compare the influence of the independent variables on each stress subscale.

Environmental and socio-demographic characteristics were used as independent variables. Prior to their use in the regression analyses, it was necessary to convert some from nominal categories into dummy variables, and to combine some response alternatives if the number in certain response categories was too small (i.e., less than 10). Consequently, the independent variables are delineated more specifically.

Environmental Variables

The first two independent variables were measured at the nominal level and were therefore converted into dummy variables. The variable representing city was assigned dummy scale values of either zero or one as specified below. Responses to the variable identifying the areas of clinical specialization were assigned dummy scale values of either zero or one. As there were nine clinical specialties, eight dummy variables were created and, initially, zeros were assigned to each dummy variable. The value of one was assigned to a dummy variable corresponding to a nurse's clinical specialization. To illustrate, 1 0 0 0 0 0 0 0 was assigned to represent ICU. Community health nursing was used as the reference category and was assigned zero for each dummy variable (e.g., 0 0 0 0 0 0 0 0). The environmental variables are listed below:

- city of employment
  (dummy variable; 0 = Calgary, 1 = Edmonton)
- clinical specialization
  (8 dummy variables; '1' was assigned to each of the

clinical specialties, which included ICU, medicine, obstetrics/gynecology paedeatrics, psychiatry, surgery, emergency, and other (e.g., rehabilitation).

Socio-demographic Variables

Four socio-demographic variables were measured using an ordinal scale. The first two, that is years of fulltime and parttime nursing experience, were reported in actual years and were then recoded using the following format:

FULLTIME EXPERIENCE (years)	SCALE VALUE
1	1
2 to 3	2
4 to 5	3
6 to 9	4
10 or more	5

PARTTIME EXPERIENCE (years)	SCALE VALUE
none	1
1 to 2	2
3 to 5	3
6 or more	4

The following two variables, that is level of education and age category, were recoded to combine the response alternatives in the upper extremes. Consequently, the highest education level was baccalaureate, and the oldest age category was fifty years or more. As the next variable, marital status, was measured at the nominal level, it was necessary to create a dummy variable to represent nonmarried and married nurses. The category, nonmarried, included the response alternatives of single, separated, divorced and widowed. The final independent variable, number of dependents, was scaled on a ratio scale such that "no dependents" was assigned a scale of zero and the response of three or more dependents was assigned a scale of three. The socio-demographic variables are listed below:

- fulltime nursing experience
  (ordinal variable, 1 to 5)
- parttime nursing experience
  (ordinal variable, 1 to 4)
- level of education
  (ordinal variable, 1 to 3)
- age category
  (ordinal variable, 1 to 4)
- marital status
  (dummy variable, 0 = nonmarried, 1 = married)
- number of dependents
  (ratio variable, 0 to 3)

Through a stepwise multiple regression procedure, using the SPSS subprogram, REGRESSION (Nie et al., 1975, pp.320 - 367), the independent variables were added to the regression equations in order of their contribution to the explanation of variation in the dependent variable. In this way, it was possible to assess the relative impact of each independent variable and to identify the variables most closely related to the nurses' "perceived stress levels", the dependent variable.

Discriminant Analysis

The second series of multivariate analyses involved the use of the SPSS subprogram, DISCRIMINANT (Nie et al., 1975, pp. 434 - 467). These analyses were conducted in order to assess the association between the presence or absence of a particular stress response (the dependent variable) and the subscale scores (the independent variables). Separate discriminant analyses were conducted for each possible stress manifestation in order to identify the subscale scores most useful in explaining the stress responses.

Discriminant analysis techniques were employed with a similar objective as the multiple regression analyses; to determine the best linear prediction equation of stress scores that explained the observed stress manifestations. In this manner, it was possible to determine which stress subscales were associated with the presence or absence of each possible stress manifestation. A stepwise discriminant procedure was performed to facilitate the evaluation of the relative ability of each independent variable to discriminate between the presence or absence of each stress response.

Transformation to discriminating variable in the stepwise procedure occurred on the basis of the defined selection criterion of Wilks' lambda. Using this method, an independent variable was selected into the linear prediction equation if it increased the F value for the test of differences among group centroids, and decreased Wilks' lambda, a measure of the variables' discriminating power. This procedure results in the optimal separation or discrimination between the groups, defined by the presence or absence of the dependent variable.

The results of the literature review were utilized to identify the possible stress responses used as the dependent variables. Survey respondents were asked to report their experiences with each of fifteen possible stress manifestations (see Appendix C). The first variable, the number of absenteeism episodes, was coded using an ordinal scheme such that no episodes of absenteeism was assigned a scale of one, one to two episodes were scaled two, three to five episodes were scaled three, and more than five episodes were assigned a scale of four. Although discriminant analysis can handle both nominal or interval scale dependent variables, it is more efficient to use regression analysis in the case of interval or ratio level dependent variables. Consequently, a stepwise multiple regression analysis was used to determine which stress subscales were most associated with the nurses' number of absences.

Stepwise discriminant analysis was appropriate for all subsequent analyses as the remaining dependent variables were measured as dichotomous variables; either the stress manifestation was present, or absent. The dependent variables used in the discriminant analyses are listed below:

- feeling fatigued
- irritability
- feelings of time pressure
- increased coffee/tea consumption
- feeling of job dissatisfaction
- forgetfulness
- insomnia
- thoughts of leaving job
- increased alcohol/drug consumption

- more aches, pains, flus
- increased use of cigarettes
- depression
- anxiety
- less leisure time

In a series of separate discriminant analyses, it was possible to identify the stress subscales most closely associated with the presence or absence of each of these stress manifestations.

3.5 Summary

The methodology used to develop and validate an instrument for the measurement of nurses' stress levels was presented in the forgoing sections. First, the formulation of the research strategy was discussed. Second, the steps employed in the development of the survey questionnaire were discussed with respect to its content, structure, selection of items, and the questionnaire pretest. The survey data collection and followup procedures were described in the following section and, in the final section, the data analysis strategies were discussed.

4. PRESENTATION AND DISCUSSION OF RESULTS

The presentation and discussion of study results parallels the sequence of analyses outlined in Chapter 3. As such, the seven major components of this chapter include: 1) a description of the respondent characteristics, 2) a delineation of the stress factors, 3) a discussion of the nursing stress scale development, 4) the results of the correlational analysis between the stress scores, 5) a discussion of the results of questionnaire reliability, 6) an examination of the stress score variation, and 7) the results of the multivariate analysis of the stress data.

4.1 Sample Characteristics

Comparisons among the participating agencies' response rates and their respondents' socio-demographic characteristics are presented below.

4.1.1 Survey Response Rate

The survey resulted in the return of 370 questionnaires of a possible 468, which represents an overall response rate of 79 per cent. Of the returned questionnaires, five were eliminated from further analysis as they were completed inaccurately or they were received after the cutoff date. Consequently, 365 usable questionnaires were retained for the analyses.

Information pertaining to the frequency of response, the proportion each agency contributed to the total response, and each agency's response rate is provided in Table 1. Examination of the table reveals that both urban hospitals had lower response rates relative to the public health agency. This was explained by the public health agency's allocation of one-half hour of work-time for questionnaire completion. Both hospitals permitted questionnaire distribution during the nurses' hours of work, but did not provide work-time for its completion. Comparison of the hospitals' relative frequencies of response indicated that the Foothills Hospital achieved a lower response rate by a difference of more than ten per cent. As comparable numbers of questionnaires were distributed at both hospitals (176 and 183 respectively), comparable response rates were expected. Officials at the Foothills Hospital accounted for their lower response rate by noting their nursing staff's exposure to a high rate of change and numerous other investigations just prior to and during the survey period.

4.1.2 Socio-demographic Characteristics

Examination of Table 2 provides an overview of the relative frequency of responses on six socio-demographic variables.

Years of Nursing Experience

The respondents' number of years of fulltime nursing experience ranged from one to forty-two years; the average number of years for the total sample was seven. The majority of nurses surveyed at both urban hospitals had five years or

TABLE 1

Sample Response Rates by Agency

Agency	Number Sent (A)	Actual Returned (B)	Usable Returns (C)	Proportion of Usable Returns(%)	Response Rate (100% x C/A)
University Hospital	176	141	139	38.1	78.9
Foothills Hospital	183	125	122	33.4	66.6
Calgary Health Services	109	104	104	28.5	95.4
Total	468	370	365	100.0	79.0

TABLE 2

Respondents' Characteristics by Agency

	Actual Number (Proportion %)			
	University Hospitals	Foothills Hospital	Calgary Health Services	Total
1. Nursing Experience(Years)				
Fulltime:				
1	18 (12.9)	19 (15.6)	3 (2.9)	40 (11.0)
2-3	37 (26.6)	27 (22.1)	15 (14.4)	79 (21.8)
4-5	35 (25.2)	19 (15.6)	25 (24.0)	79 (21.8)
6-9	18 (12.9)	29 (23.8)	31 (29.8)	78 (21.5)
10+	31 (22.3)	26 (21.3)	29 (27.9)	86 (23.8)
Total	139 (100.0)	120 (98.4)	103 (100.0)	362 (100.0)
Parttime:				
None	116 (83.5)	92 (75.4)	82 (78.8)	290 (79.5)
1-2	11 (7.9)	15 (12.3)	8 (7.7)	34 (9.3)
3-5	7 (5.0)	8 (6.6)	10 (9.6)	25 (6.8)
6+	5 (3.6)	7 (5.7)	4 (3.8)	16 (4.4)
Total	139 (100.0)	122 (100.0)	104 (100.0)	365 (100.0)
2. Education				
RN only	100 (71.9)	95 (77.9)	0 (-)	195 (53.4)
RN plus	12 (8.6)	12 (9.8)	22 (21.2)	46 (12.6)
BSc	27 (19.4)	15 (12.3)	82 (78.8)	124 (34.0)
Total	139 (100.0)	122 (100.0)	104 (100.0)	365 (100.0)
3. Age Category				
20-29	90 (65.7)	74 (60.7)	50 (48.1)	214 (59.0)
30-39	29 (21.2)	28 (23.0)	27 (26.0)	84 (23.1)
40-49	12 (8.8)	16 (13.1)	15 (14.4)	43 (11.8)
50+	6 (4.4)	4 (3.3)	12 (11.5)	22 (6.1)
Total	137 (100.0)	122 (100.0)	104 (100.0)	363 (100.0)
4. Marital Status				
Single	61 (43.9)	45 (36.9)	23 (22.5)	129 (35.5)
Married	70 (50.4)	70 (57.4)	70 (68.6)	210 (57.9)
Sep/Div/Wid	8 (5.7)	7 (5.7)	9 (8.8)	24 (6.6)
Total	139 (100.0)	122 (100.0)	102 (100.0)	363 (100.0)
5. Dependents				
None	98 (71.0)	82 (67.8)	64 (62.7)	244 (67.6)
1	19 (13.8)	18 (14.9)	15 (14.7)	52 (14.4)
2	8 (5.8)	12 (9.9)	14 (13.7)	34 (9.4)
3+	13 (9.4)	9 (7.4)	9 (8.9)	31 (8.6)
Total	138 (100.0)	121 (100.0)	102 (100.0)	361 (100.0)

less of fulltime experience (University Hospitals, 65%; Foothills Hospital, 53%). At the Calgary Health Services, the majority of nurses (58%) surveyed had six years or more fulltime experience. With respect to the number of years of parttime nursing experience, the majority of nurses surveyed had no parttime experience. The nurses employed at the Foothills Hospital, however, were most likely to have some parttime nursing experience relative to the nurses at either of the other agencies.

Level of Education

The respondents' levels of education differed markedly by employment setting. The majority of nurses employed at both acute care hospitals (72% and 78%) held a registered nurses' diploma whereas the majority of nurses (78%) at the Calgary Health Services had obtained a baccalaureate degree. In comparing the subsamples of hospital-based nurses, more nurses employed at the University Hospitals had obtained higher levels of education relative to those employed at the Foothills Hospital.

Age Category

In examining the survey sample's age categories, Table 2 shows that the majority of nurses surveyed at both hospitals (66% and 61% respectively) were between the ages of twenty and twenty-nine years relative to only forty-eight per cent in the same age category at the Calgary Health Services. The majority of the public health nurses (52%) surveyed were thirty years or older.

Marital Status

The majority of the survey sample were married. Relative to the other organizations, Calgary Health Services employed the most married nurses (69%), then the Foothills Hospital (57%), and lastly the University Hospitals (50%). More single nurses were employed at the University Hospitals (44%) relative to the other organizations and the least were employed at the Calgary Health Services (23%).

Number of Dependents

The number of dependents for whom respondents were responsible ranged from none to three or more. The majority of the survey sample had no dependents, although the nurses surveyed at the Foothills Hospital were more likely to have one or more dependents than the nurses surveyed at the other agencies.

On average, the nurses surveyed at the Calgary Health Services had the most years of fulltime and parttime nursing experience, had the highest level of education, were the oldest, and were most likely to be married relative to the nurses surveyed at either hospital. All of the nurses in the survey sample were relatively unencumbered by dependent responsibilities, but more nurses surveyed at the Foothills Hospital had dependents than the other nurses. In comparing the characteristics of the subsamples of hospital-based nurses, it was observed that, on average, the nurses surveyed at the University Hospitals were less experienced, had more education, were younger, were more likely to be single, and had fewer dependents than the nurses surveyed at the Foothills Hospital.

Areas of Clinical Specialization

Examination of Table 3 shows the number of respondents at each hospital by the nurses' field of clinical specialization. Most hospital respondents worked on surgical units, with the majority of them employed by the University Hospitals. Emergency nurses were the least represented in the sample of hospital nurses surveyed. Only fifteen responded to the survey questionnaire and they were mainly employed at the University Hospitals.

Information about the responses to the remaining questionnaire variables are reported in Tables 4 and 5 and the accompanying discussion is located in the following section.

4.1.3 Distributional Characteristics of Stress Data

The distributional characteristics of the environmental stimuli and possible stress manifestations are presented in this section.

Environmental Stimuli

The mean response scores for the environmental stressors are presented in Table 4. Responses to the variables representing nurses' potential environmental stressors were weighted by the following values, 0, 1, 2, and 3, depending on the level of stress, and then their mean scores were obtained for respondents at each agency and for

TABLE 3

Number of Respondents at Each Hospital by Clinical Specialty

Clinical Specialty	Actual Number (Proportion/Hospital)					
	University Hospitals		Foothills Hospital		Total	
ICU	14	(10.1)	8	(6.6)	22	(8.5)
Medicine	21	(15.2)	22	(18.2)	43	(16.6)
Ob/Gyn	15	(10.9)	24	(19.8)	39	(15.1)
Paediatrics	18	(13.0)	6	(5.0)	24	(9.3)
Psychiatry	13	(9.4)	8	(6.6)	21	(8.1)
Surgery	47	(34.1)	24	(19.8)	71	(27.4)
Emergency	10	(7.2)	5	(4.1)	15	(5.8)
Other Units (e.g., auxillary, NICU)	-	-	24	(19.8)	24	(9.3)
TOTAL	138	(100.0)	121	(100.0)	259	(100.0)

TABLE 4

Mean Response Score[1] by Agency for Environmental Stressors

Variable	Mean Score			
	University Hospitals	Foothills Hospital	Calgary Health Services	Total Sample
1 work load	1.52	1.49	1.50	1.51
2 work space	1.54	1.56	1.33	1.35
3 number of interactions	1.27	1.12	1.06	1.16
4 performance feedback	1.17	0.91	1.18	1.09
5 IPR with co-workers	0.80	0.80	0.74	0.78
6 career advancement	1.04	1.12	1.24	1.12
7 decision involvement	1.43	1.47	1.66	1.51
8 pay satisfaction	0.60	0.59	1.18	0.76
9 IPR with patients/clients	1.17	0.96	1.05	1.06
10 job preparation	1.01	0.96	0.81	0.94
11 work variety	0.96	0.99	0.97	0.97
12 amount of change	1.14	1.06	1.24	1.14
13 IPR with physicians	1.28	1.29	0.76	1.13
14 resource availability	1.11	0.98	0.92	1.01
15 work accomplishment	1.16	1.21	1.12	1.16
16 job security	0.78	0.49	0.64	0.65
17 information access	0.78	0.78	0.91	0.82
18 job status	0.73	0.74	0.70	0.72
19 noise level	1.30	1.10	1.02	1.15
20 travel	0.41	0.25	0.79	0.46

---

[1] The following weights were assigned: no stress 0; little stress 1; moderate stress 2; great stress 3

TABLE 4 (Continued)

Variable	Mean Score			
	University Hospitals	Foothills Hospital	Calgary Health Services	Total Sample
21 job ambiguity	1.07	0.90	1.01	0.99
22 work shifts	1.17	1.23	0.68	1.05
23 difficult patients/clients	1.67	1.58	1.20	1.51
24 intellectual stimulation	0.82	1.11	0.93	0.95
25 IPR with supervisor	1.01	0.89	1.12	1.00
26 professional standard	1.12	1.06	1.01	1.13
27 family time	1.23	1.43	1.01	1.24
28 dual responsibilities	1.02	1.22	1.31	1.17
29 social contacts	0.83	0.84	0.86	0.84
30 family support	0.73	0.61	0.77	0.70
31 financial security	0.91	1.04	1.09	1.01
32 state of health	0.67	0.70	0.85	0.73

all respondents combined.

Examination of the final column in Table 4 reveals that the highest level of perceived stress for the total sample was associated with workload and working with difficult patients or clients (variables 1 and 23). Comparing each agency's mean stress scores for these variables indicated that the University Hospitals' nurses perceived the highest stress from these sources. Stress due to the adequacy of the workspace (variable 2) was the next highest stressor for the total sample. When the mean scores for workspace were compared by agency, the nurses employed at Foothills Hospital were found to have reported the highest levels of stress for this item.

The least stressful variable for the total sample was the amount of time spent in work-related travel (variable 20). Examination of each agency's nurses' mean stress scores showed that Foothills Hospital's nurses found travel least stressful, Calgary Health Services' nurses reported travel the most stressful.

Possible Stress Manifestations

Table 5 shows the number of respondents who experienced the possible stress manifestations. The majority of the survey sample (57%) reported one to two episodes of absenteeism during the six month period preceding the survey. Consequently, the possible average annual absenteeism rate for the majority of the survey sample would

TABLE 5

Number of Possible Stress Manifestations[1]

Variable	Actual Number	(Proportion)
1. Number of Absences/6 months		
None	99	(27.2)
1-2 episodes	207	(56.9)
3-5 episodes	47	(12.9)
6+ episodes	11	(3.0)
Total	364	(100.0)
2. Reasons for Absence		
physical ailments	233	(63.8)[2]
mental health day	40	(11.0)
fatigue	35	(9.6)
family responsibility	20	(5.5)
job pressure	13	(3.6)
transportation	1	(0.3)
other reasons	13	(3.6)
3. Stress State or Behavior		
fatigue	225	(61.7)
irritability	184	(50.4)
time pressure	210	(57.5)
more coffee/tea	56	(15.3)
job dissatisfaction	170	(46.6)
forgetfulness	88	(24.1)
insomnia	90	(24.7)
thoughts of leaving job	164	(44.9)
more alcohol/drugs	17	(4.7)
more aches	45	(12.3)
more cigarettes	36	(9.9)
depression	81	(22.2)
anxiety	114	(31.2)
less leisure	143	(39.2)

---

[1] The responses are not mutually exclusive except for item 1.

[2] $n = 365$.

be two to four episodes. The most frequently reported reason for the absenteeism by the majority of the nurses surveyed (64%) was the presence of physical ailments.

Only three of the fourteen other possible stress manifestations were present for a majority of the respondents. Sixty-two per cent of the survey sample reported experiencing more fatigue in the three months preceding the survey period; fifty-eight per cent experienced feelings of time pressure; and fifty per cent indicated that they were more irritable. The next most frequently experienced stress manifestation was that of job dissatisfaction. Slightly less than half of the survey sample (47%) reported feelings of job dissatisfaction during a similar time period.

In the following section, information about the respondents' absenteeism episodes are examined in more detail.

Absenteeism Episodes

Examination of Table 6 shows the relative differences in the number of absences reported by the survey respondents at each agency. Approximately eighty-three per cent of the nurses surveyed at the University Hospitals reported *one or more* episodes of absenteeism in the six month period prior to the survey, whereas seventy-four per cent of Foothills Hospital's nurses and fifty-eight per cent of Calgary Health Services' nurses reported a similar number of absenteeism episodes.

TABLE 6

Number of Absences by Agency

Number of Absences	Actual Number (Proportion %)							
	University Hospitals		Foothills Hospital		Calgary Health Services		Total	
No Absence	24	(17.3)	32	(26.2)	43	(41.7)	99	(27.2)
1-2 Episodes	86	(61.9)	64	(52.5)	57	(55.3)	207	(56.9)
3+ Episodes	29	(20.9)	26	(21.3)	3	(2.9)	58	(15.9)
TOTAL	139	(100.0)	122	(100.0)	103	(100.0)	364	(100.0)

The relative frequencies of nurses reporting three or more absenteeism episodes in the preceding six months at the University Hospitals and the Foothills Hospital were comparable (21%). However, considerably fewer nurses at the Calgary Health Services (3%) reported a similar absenteeism rate. Furthermore, the nurses surveyed at Calgary Health Services had the lowest absenteeism rate of the other agencies. The reasons for this were unknown.

Tables 7 through 12 show the number of absences reported by various groups of respondents differentiated by their socio-demographic characteristics. Table 7, for example, presents an overview of the absenteeism rates reported by nurses employed on eight types of hospital nursing units. It shows that approximately forty-one per cent of ICU nurses had no absence during the six months prior to the survey, and about forty-six per cent of them had only one or two absences during the same period. ICU and emergency unit nurses had the highest rates of attendence (41% and 40% respectively had no absences), whereas surgical nurses reported the most absences (92% were absent one or more times).

The final table, Table 12, shows the total sample's number of absences differentiated by the reasons respondents provided. To illustrate, the table shows that physical ailments (n=232) were the most frequent reason for all episodes of absence and job pressure (n=13) the least.

TABLE 7

Number of Absences by Clinical Specialty

Number of Absences	Actual Number (Proportion %)								
	ICU	Medicine	Ob/Gyn	Paeds	Psych	Surg	Emerg	Other	Total
No Absence	9(40.9)	14(32.6)	7(17.9)	5(20.8)	3(14.3)	6(8.5)	6(40.0)	6(25.0)	56(21.6)
1-2 Episodes	10(45.5)	22(51.2)	26(66.7)	15(62.5)	14(66.7)	39(54.9)	9(60.0)	14(58.3)	149(57.5)
3-4 Episodes	3(13.6)	7(16.3)	6(15.4)	4(16.7)	4(19.0)	26(36.6)	- -	4(16.7)	54(20.8)
TOTAL	22(100.0)	43(100.0)	39(100.0)	24(100.0)	21(100.0)	71(100.0)	15(100.0)	24(100.0)	255(100.0)

TABLE 8

Number of Absences by Education Level

Number of Absences	Actual Number (Proportion %)			
	R.N.	R.N. and Courses	B.Sc./M.Sc.	Total
No Absence	36 (18.5)	18 (40.0)	45 (36.6)	99 (27.2)
1-2 Episodes	111 (56.9)	26 (57.8)	70 (56.1)	207 (56.9)
3+ Episodes	48 (24.6)	1 (2.2)	9 (7.3)	58 (15.9)
TOTAL	195 (100.0)	45 (100.0)	124 (100.0)	364 (100.0)

TABLE 9

Number of Absences by Age Category (Years)

Number of Absences	Actual Number (Proportion %)				
	20-29	30-39	40-49	50+	Total
No Absence	45 (21.0)	29 (33.7)	16 (37.2)	9 (42.9)	99 (27.2)
1-2 Episodes	125 (58.4)	46 (53.5)	25 (58.1)	11 (52.4)	207 (56.9)
3+ Episodes	44 (20.6)	11 (12.8)	2 (4.6)	1 (4.8)	58 (15.9)
TOTAL	214 (100.0)	86 (100.0)	43 (100.0)	21 (100.0)	364 (100.0)

TABLE 10

Number of Absences by Marital Status

Number of Absences	Actual Number (Proportion %)			
	Single	Married	Separated, Divorced, Widowed	Total
No Absence	30 (23.3)	62 (29.5)	7 (30.4)	99 (27.3)
1-2 Episodes	69 (53.5)	122 (58.1)	14 (60.9)	205 (56.6)
3+ Episodes	30 (23.3)	26 (12.4)	2 (8.7)	58 (16.0)
TOTAL	129 (100.0)	210 (100.0)	23 (100.0)	362 (100.0)

TABLE 11

Number of Absences by Number of Dependent Responsibilities

Number of Absences	Actual Number (Proportion %)				
	No Dependents	One	Two	Three or More	Total
No Absence	67 (27.5)	11 (21.2)	11 (32.4)	9 (29.0)	98 (27.1)
1-2 Episodes	136 (55.7)	30 (57.7)	20 (58.8)	19 (61.3)	205 (56.8)
3+ Episodes	41 (16.8)	11 (21.2)	3 (8.8)	3 (9.7)	58 (16.1)
TOTAL	244 (100.0)	52 (100.0)	34 (100.0)	31 (100.0)	361 (100.0)

TABLE 12

Number of Absences by Reasons Given for Absence

Number of Absences	Actual Number (Proportion %)						
	Physical Ailments	Mental Health	Fatigue	Family Responsibility	Job Pressure	Travel Concerns	Total
1-2 Episodes	176 (75.9)	21 (53.8)	17 (48.6)	14 (73.7)	9 (69.2)	10 (71.4)	247 (70.2)
3+ Episodes	56 (24.1)	18 (46.2)	18 (51.4)	5 (26.3)	4 (30.8)	4 (28.6)	105 (29.8)
TOTAL	232 (100.0)	39 (100.0)	35 (100.0)	19 (100.0)	13 (100.0)	14 (100.0)	352 (100.0)

4.2 Factor Analysis of Stressor Variables

The principal components factor analysis methodology, delineated in Chapter 3, was applied to the thirty-two stressor variables. It yielded an eight-factor solution that was subsequently rotated using both varimax and oblique methods. The eight factors accounted for fifty-seven per cent of the total variation in the stress data.

Varimax Rotation Factor Solution

The eight-factor solution derived by varimax rotation is presented in Table 13. Examination of the variables that loaded highly on each factor revealed information about the respondents' major sources of environmental stress. It is important to note that weakly loaded variables indirectly aided the interpretation of factor meaning by suggesting what variables were not associated with the factor. Four variables failed to load on any one factor (variables 5, IPR with coworkers, 14, resource availability, 20, travel, and 22, shiftwork).

Factor interpretation, and comparison of actual factor results, with the hypothesized sources of stress, follows. It was assumed *a priori* that nurses' major sources of environmental stress could be identified by the six conceptual categories discussed in Chapter 2, Section 2.3.1. Each questionnaire variable was associated, *a priori*, with one of these six content areas. Table 14 shows the comparison of actual factor results with these hypothesized content areas.

TABLE 13

Factor Solution Derived by Varimax Rotation

Variable	Factor Loading[1]							
	1	2	3	4	5	6	7	8
1 work load	0.47	0.09	-0.04	0.13	0.18	0.12	0.07	0.09
3 number of interactions	0.59	0.05	0.04	0.11	0.06	0.06	0.15	0.19
9 IPR with patients/clients	0.69	0.14	0.13	0.06	-0.04	0.11	-0.06	0.06
10 job preparation	0.58	0.12	0.09	0.08	0.08	0.01	0.16	0.15
11 work variety	0.55	0.25	-0.01	0.09	0.07	0.34	-0.25	0.03
12 amount of change	0.59	0.00	-0.02	0.03	-0.02	0.22	0.06	0.07
13 IPR with physicians	0.56	0.17	0.13	-0.10	0.06	-0.10	0.16	0.06
21 job ambiguity	0.44	0.25	-0.02	0.25	0.09	0.14	0.16	0.09
23 difficult patients/clients	0.58	0.15	0.08	0.03	0.02	-0.05	0.01	0.01
6 career advancement	-0.03	0.41	0.13	0.01	0.12	0.40	0.10	-0.01
15 work accomplishment	0.35	0.49	0.13	-0.12	0.10	-0.01	0.05	0.00
17 information access	0.24	0.44	0.02	0.12	0.01	0.12	0.18	0.15
18 job status	0.01	0.55	0.06	-0.16	0.03	0.14	0.06	0.10
24 intellectual stimulation	0.13	0.61	0.15	-0.11	0.03	0.22	-0.09	0.13
25 IPR with supervisor	0.15	0.42	-0.03	0.18	0.03	0.05	0.35	-0.10
26 professional standard	0.29	0.61	-0.05	0.07	0.05	-0.05	0.12	-0.03
29 social contacts	0.14	0.12	0.86	0.21	0.15	0.03	0.05	0.10
30 family support	0.17	0.15	0.66	0.28	0.12	0.09	0.06	0.09

---

[1] Selection of variables was based on factor loadings ≥ 0.40 .

TABLE 13 (Continued)

Variable	Factor Loading[1]							
	1	2	3	4	5	6	7	8
16 job security	0.19	0.33	0.06	0.53	0.07	0.05	0.18	0.07
31 financial security	-0.13	0.02	0.27	0.49	0.14	0.15	0.02	0.02
32 state of health	0.09	0.01	0.17	0.57	0.03	-0.01	-0.03	0.04
27 family time	0.09	0.11	0.20	0.10	0.89	0.03	-0.04	0.08
28 dual responsibilities	0.12	-0.08	0.35	0.37	0.43	0.28	0.03	0.03
7 decision involvement	0.32	0.29	0.05	0.09	0.04	0.42	0.25	-0.07
8 pay satisfaction	0.11	0.15	0.05	0.17	0.01	0.47	0.09	0.10
4 performance feedback	0.20	0.25	0.08	0.04	-0.05	0.24	0.57	0.18
2 work space	0.15	0.11	0.08	-0.03	0.07	0.06	0.14	0.52
19 noise level	0.26	0.04	0.07	0.24	0.04	0.02	-0.06	0.59

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[1] Selection of variables was based on factor loadings ≥ 0.40 .

TABLE 14

Factor Identification of Variables Compared with Postulated Stress Source

FACTOR 1. The nature of work tasks and roles

Variable	Postulated Source of Stress
1 workload	work tasks
3 number of interactions	work roles
9 IPR with patients/clients	work social relationships
10 job preparation	work tasks and roles
11 work task variety	work tasks
12 amount of change	work tasks
13 IPR with physicians	work social relationships
21 job ambiguity	work roles
23 difficult patients/clients	work tasks

FACTOR 2. Opportunities for personal and professional growth

Variable	Postulated Source of Stress
6 career advancement	organizational behavior setting
15 work accomplishment	work tasks
17 information access	organizational behavior setting
18 job status	organizational behavior setting
24 intellectual stimulation	work tasks
25 IPR with supervisor	work social relationships
26 professional standard	organizational behavior setting

FACTOR 3. Opportunities for social support

Variable	Postulated Source of Stress
29 social contacts	home and social environments
30 family support	home and social environments

TABLE 14 (Continued)

FACTOR 4. Degree of personal economic security

Variable	Postulated Source of Stress
16 job security	home and social environments
31 financial security	home and social environments
32 state of health	home and social environments

FACTOR 5. Amount of family conflict

Variable	Postulated Source of Stress
27 family time	home and social environments
28 dual responsibilities	home and social environments

FACTOR 6. Level of job satisfaction

Variable	Postulated Source of Stress
7 decision involvement	organizational behavior setting
8 pay satisfaction	organizational behavior setting

FACTOR 7. Amount of performance appraisal

Variable	Postulated Source of Stress
4 performance feedback	organizational behavior setting

FACTOR 8. Adequacy of physical working conditions

Variable	Postulated Source of Stress
2 work space	physical working conditions
19 noise level	physical working conditions

The varimax factor solution provided some evidence that the questionnaire measured five of the six hypothesized sources of environmental stress. Factor equivalents for all the hypothesized stress sources except, work social relationships, emerged. Furthermore, separate factors for *occupational tasks and roles* failed to emerge, but Factor 1 appeared to encompass both elements and therefore, was labelled as such. Two variables (variables 9 and 13), previously defined by the category, work social relationships, loaded instead on factor 1. An argument for their association with this factor was made, however, as patient and physician interpersonal relations are part of nurses' work duties and roles. The second factor that emerged was termed *opportunities for personal and professional growth* as it encompassed variables associated with personal and professional development and challenge. Its content appeared most consistent with the category, organizational behavior setting, although three variables related to work tasks and social relationships were encompassed by it. Examination of these variables, that is variables 15, 24, and 25, revealed their logical relationship with the identified factor. The third factor, labelled *opportunities for social support*, was equivalent to the previously hypothesized construct, home and social environments. Variables loading on the fourth and fifth factors, labelled *degree of personal economic security* and *amount of family conflict* respectively, appeared consistent with their respective hypothesized sources of stress. They were expected to emerge as a single factor, however, rather than as separate constructs. The sixth factor, labelled *level of job satisfaction*, and the seventh factor, named *amount of performance appraisal*, encompassed variables associated with the organizational behavior setting. That they emerged as separate entities is likely a reflection of the broad nature of this hypothesized source of stress. The final factor was consistent with the postulated category, *physical working conditions*.

The failure of some variables to load highly on any factor and the loading of variables on a factor other than that postulated in advance could have had several causes. Failure to adequately operationalize the variable or to define the underlying conceptual framework may have been problematic. Furthermore, it is possible that the survey sample was inappropriate, not representative, or too small and therefore was unable to provide satisfactory results. Examination of the variables loading on a factor other than that postulated *a priori* suggested that part of the problem lay in defining separate constructs. The inter-relatedness of many questionnaire variables and the multi-faceted nature of the hypothesized sources of stress suggests that some of the underlying conceptual framework might have been faulty.

In summary, varimax rotation of the eight principal factors resulted in an interpretable terminal solution. The first three factors appeared to encompass four of the six hypothesized sources of nurses' environmental stress:

occupational tasks and roles, the organizational behavior setting, and the home and social environments. A separate factor encompassing work social relationships failed to emerge as a separate entity, but associated variables loaded on the first two factors. The final postulated source of nurses' stress, physical working conditions, emerged as a separate entity.

The use of an oblique factor rotation resulted in the emergence of a factor structure that was not satisfactory in terms of a clear, interpretable solution. Consequently, the decision was made to use the varimax factor solution for further data analysis and to disregard the oblique factor solution. In the following section, the process of scale development, which exploited the varimax solution, is discussed.

4.3 The Nursing Stress Scale Development

The process of scale development was based on the conceptual framework and literature review of the construct, as well as the empirical results of the factor analysis. The Nursing Stress Scale was comprised of eight subscales that corresponded to each factor discussed in the previous section and shown in Table 14. Consequently, each subscale measures a major source of the survey respondents' environmental stress. Appendix E presents the variables comprising each subscale and their corresponding labels. Comparison of Appendix E with Table 13 identifies the set of variables that loaded substantially on each factor and also that were used in the derivation of the corresponding subscale.

For each case in the data file, eight subscale scores were derived by adding together the responses of the variables forming each subscale. As ordinal scaling of respondents' responses was used, it would be appropriate therefore to rank respondents in terms of the eight levels of environmental stress they experienced. Thus, for example, it would be possible to describe a particular survey respondent as experiencing higher, lower, or similar levels of stress as compared with another survey respondent. Furthermore, as the ordinal scales were summed to obtain the subscale scores, they were assumed to be at the interval scale level in subsequent analyses.

Data reduction occurred in the process of scale development in three ways: the first thirty-two survey questionnaire variables were reduced to twenty-eight variables that formed the Nursing Stress Scale; furthermore, these twenty-eight variables were reduced to eight subscale scores that supposedly represented nurses' sources of environmental stress. Unlike the factor scores, however, the subscale scores did not reflect the influence of the variables excluded from the subscale structure. Attendant upon these data reduction steps, therefore, was the potential risk of substantial information loss. Correlational analysis was performed to assess the effect of these steps and the results of these analyses are presented next.

4.4 Correlational Analysis

Eight correlation coefficients were obtained by determining the level of association for each pair of corresponding factor and subscale scores. As postulated *a priori*, the results confirmed the existence of a strong positive linear relationship for each set of scores. Table 15 summarizes these results. It would seem, therefore, that the information losses were negligible. Closer examination of the coefficients revealed that the first three and the final one reflected the strongest relationships. As these four coefficients were derived from the scores of subscales composed of many variables and a few variables, the results did not seem to bear any relationship to the number of variables comprising each subscale score. It is possible that a high correlation coefficient tended to reflect the content validity of the variables comprising each subscale score, regardless of the number of variables. The lowest correlation coefficients were obtained for subscales 6 and 7, thus indicating that they were the least satisfactory proxies of their respective stress factors.

In summary, the Nursing Stress Scale, comprised of eight subscale structures, satisfactorily represented nurses' eight major sources of environmental stress. In subsequent analyses, the survey respondents' scores on these eight subscales were used in the assessment of the variables

TABLE 15

Correlational Analysis of Stress Scores

Subscale or Factor		Correlation Coefficient (Pearson's R)
STRESS1:	Work Tasks/Roles	0.9540
STRESS2:	Personal/Professional Growth Opportunities	0.9245
STRESS3:	Social Support	0.9011
STRESS4:	Personal Economic Security	0.8846
STRESS5:	Family Conflict	0.8209
STRESS6:	Job Satisfaction	0.7305
STRESS7:	Performance Appraisal	0.7519
STRESS8:	Physical Working Conditions	0.9187

influencing their reported stress levels. Prior to the discussion of those results, however, the results of the questionnaire reliability estimation are presented.

4.5 Results of Reliability Estimation

As noted in Chapter 3, the survey questionnaire represented a modification of existing instruments; an assessment of its reliability was required therefore. The reliability of the eight subscale measurements was assessed and the results are presented below.

Examination of Table 16 shows that five subscales had reliability (Cronbach's alpha) coefficients equal to or greater than 0.59, suggestive of a moderately high degree of internal consistency. The final three subscales had low reliability coefficients. While not desirable, these results can be interpreted as indicating that five subscales dependably measured their respective stress sources and three subscales failed to provide as internally dependable measurements. However, as alpha measures the lower bounds of reliability if the scales measure more than one trait, and the inter-relatedness of the variables comprising the subscales has been shown previously, it is likely that the reliability coefficients are underestimated. Consequently, an acceptable level of reliability was estimated for the subscales.

TABLE 16

Reliability (Alpha) Coefficients for Stress Subscales

Stress Subscale	Alpha Coefficient
STRESS1: Work Tasks/Roles	0.830
STRESS2: Personal/Professional Growth Opportunities	0.747
STRESS3: Social Support	0.838
STRESS4: Personal Economic Security	0.590
STRESS5: Family Conflict	0.684
STRESS6: Job Satisfaction	0.447
STRESS7: Performance Appraisal	0.520
STRESS8: Physical Working Conditions	0.513

4.6 Stress Score Variation

Using a one-way, fixed effects model, analysis of variance was carried out to assess between-group differences in respondents' mean stress scores. The effects of nurses' employment variables and their socio-demographic characteristics on their subscale scores were investigated separately. As the value of the mean stress score is somewhat influenced by the number of items comprising each subscale, comparisons between subscale mean scores were meaningless. The results of these analyses are reported in the following sections.

4.6.1 Employment Variables

Four summary tables (one for each employment variable) demonstrate the impact of each on the respondents' mean subscale scores. Table 17 shows an overview of eight subscale scores for respondents at each agency. Significant differences were observed between groups of respondents' scores on two subscales: the *level of job satisfaction* (STRESS6), and the *adequacy of physical working conditions* (STRESS8). Calgary Health Services' nurses reported significantly higher levels of STRESS6 than did either group of hospital nurses. The reasons for this result are unknown as it was anticipated that hospital nurses would experience higher levels of stress generally. Comparison of the STRESS8 scores showed that the University Hospitals' nurses reported significantly more stress than the Foothills Hospital's

TABLE 17

Summary of Nursing Stress Scale Mean Score Variation by Agency

Nursing Stress Scale	Mean Stress Score		
	University Hospitals	Foothills Hospital	Calgary Health Services
STRESS1: Work Tasks/Roles	10.92	10.45	9.56
STRESS2: Personal/Professional Growth Opportunities	6.71	6.91	7.00
STRESS3: Social Support	1.57	1.48	1.59
STRESS4: Personal Economic Security	2.34	2.28	2.53
STRESS5: Family Conflict	2.21	2.68	2.30
STRESS6: Job Satisfaction	2.08^{a}	2.06^{b}	$2.84^{a,b}$
STRESS7: Performance Appraisal	1.16	0.92	1.19
STRESS8: Physical Working Conditions	2.88^{a}	2.27^{a}	2.40

[a] Denotes a significant difference between pair at the 0.05 level. For example, for STRESS6, the mean stress score of the University Hospital's respondents was significantly lower than the mean stress score of the Calgary Health Services' respondents.

[b] Denotes a significant difference between pair at the 0.05 level. For example, for STRESS6, the mean stress score of the Foothills Hospital's respondents was significantly lower than the mean stress score of the Calgary Health Services' respondents.

nurses. This finding was explained by the major capital construction project underway at the University Hospitals during the survey period.

Table 18 contrasts differences in the scores of the hospital and community nurses. Significant between-group differences existed for only one subscale, STRESS6. In this case, community nurses scored higher than the hospital nurses. Similarly, Table 19 shows that Calgary-based nurses experienced a significantly higher level of STRESS6 when compared with Edmonton nurses. The lower level of mean stress reflected in this latter result is explained by the inclusion of the Foothills Hospital's nurses in the Calgary group. As depicted in Table 17, their level of STRESS6 was the lowest of the three groups. Further examination of Table 19 reveals that Edmonton respondents had higher levels of STRESS8. Again, this finding is likely attributable to the construction project at the University Hospitals.

Table 20 illustrates the impact of nurses' area of clinical specialization on their subscale scores. Significant differences existed for pairs of specialty areas on the following subscales: *work tasks and roles* (STRESS1), *personal and professional growth opportunities* (STRESS2), STRESS6, and STRESS8. Examining each in order, the results indicated that ICU nurses (n=22) experienced more STRESS1 than obstetrical and gynecological nurses (n=39). The literature provides some evidence to support this finding. Surgical nurses (n=71) reported significantly more STRESS2

TABLE 18

Summary of Nursing Stress Scale Mean Score Variation by Work Setting

Nursing Stress Scale		Mean Stress Score	
		Hospital	Community Health
STRESS1:	Work Tasks/Roles	10.70	9.56
STRESS2:	Personal/Professional Growth Opportunities	6.81	7.00
STRESS3:	Social Support	1.52	1.59
STRESS4:	Personal Economic Security	2.31	2.53
STRESS5:	Family Conflict	2.43	2.30
STRESS6:	Job Satisfaction	2.07[a]	2.84[a]
STRESS7:	Performance Appraisal	1.05	1.19
STRESS8:	Physical Working Conditions	2.59	2.40

[a] Denotes a significant difference between pair at the 0.05 level. For example, for STRESS6, the mean stress score of the hospital respondents was significantly lower than the mean stress score of the community health respondents.

TABLE 19

Summary of Nursing Stress Scale Mean Score Variation by City

Nursing Stress Scale		Mean Stress Score	
		Edmonton	Calgary
STRESS1:	Work Tasks/Roles	10.92	10.04
STRESS2:	Personal/Professional Growth Opportunities	6.71	6.95
STRESS3:	Social Support	1.57	1.53
STRESS4:	Personal Economic Security	2.34	2.40
STRESS5:	Family Conflict	2.21	2.50
STRESS6:	Job Satisfaction	2.08[a]	2.42[a]
STRESS7:	Performance Appraisal	1.16	1.05
STRESS8:	Physical Working Conditions	2.88[a]	2.33[a]

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[a] Denotes a significant difference between pair at the 0.05 level. For example, for STRESS6, the mean stress score of Edmonton repondents was significantly lower than that of the Calgary respondents.

TABLE 20

Summary of Nursing Stress Scale Mean Score Variation by Area of Clinical Specialization

Nursing Stress Scale	Mean Stress Score								
	Community Health	ICU	Med	Ob/Gyn	Paed	Psych	Surg	Emerg	Other
STRESS1: Work Tasks/ Roles	9.56	13.76[a]	10.64	8.47[a]	11.91	9.38	11.90	7.47	10.58
STRESS2: Personal/ Professional Growth Opportunities	7.00	6.86	7.38	6.36	6.87	7.10	8.00[a]	3.07[a]	5.79
STRESS3: Social Support	1.59	1.95	1.10	1.44	1.96	1.33	1.66	1.27	1.63
STRESS4: Personal Economic Security	2.53	1.76	2.21	2.11	2.48	2.33	2.55	2.42	2.40
STRESS5: Family Conflict	2.30	3.05	2.03	2.53	2.87	2.00	2.31	2.07	3.00
STRESS6: Job Satisfaction	2.84[a]	2.00	2.08	1.72[a]	2.22	2.57	2.20	1.67	2.08
STRESS7: Performance Appraisal	1.19	1.24	1.00	0.78	1.43	0.76	1.20	1.13	0.83
STRESS8: Physical Working Conditions	2.40	3.57	2.33	2.03[a]	3.74[a]	1.90	2.60	2.60	2.38

[a] Denotes a significant difference between pair at the 0.05 level. For example, for STRESS2, the mean stress score of the surgical nurses was significantly higher than that of the emergency respondents.

than did their emergency colleagues (n=15). The reasons are unknown; however, it is postulated that emergency nurses had more worktime flexibility to further their professional interests. When community nursing (n=104) was compared with other nursing specialties, community nurses scored higher in the area of STRESS6. Their scores were significantly higher than those of the obstetrical and gynecological nurses. Finally, paediatric nurses (n=24) reported higher scores due to STRESS8 than did the obstetrical and gynecological nurses. The reasons were unknown. In view of the small sample sizes for several of the preceding analyses, significant between-group differences may well indicate that large 'effect' sizes are present as differences would normally be undetectable with small sample sizes unless the differences were large.

In summary, the results of this series of analyses indicated that the following employment variables were likely to be associated with higher mean stress scores for the specified environmental source:

1. Community nurses perceived higher stress associated with STRESS6 than hospital nurses;
2. University Hospitals' nurses perceived higher stress due to STRESS8 than Foothills Hospital's nurses;
3. ICU nurses had more STRESS1 than obstetrical and gynecological nurses;
4. Surgical nurses reported higher stress levels due to STRESS2 than did emergency nurses; and

5. Paediatric nurses scored higher than obstetrical and gynecological nurses on STRESS8.

4.6.2 Socio-demographic Variables

In this section, the impact of six socio-demographic characteristics on each of the nurses' eight subscale scores are reported.

Years of Nursing Experience

Tables 21 and 22 illustrate between-group differences for the eight mean subscale scores, grouped according to years of fulltime and parttime nursing experience. Table 21 shows that nurses with "ten or more" years of fulltime experience had significantly higher levels of stress due to *economic security* (STRESS4) than did nurses with either "6-9" or "4-5" years of fulltime experience. These findings were consistent with the economic climate present during the survey period, which affected the job security of many workers, particularly the middle aged. Table 22 shows that the number of years of parttime nursing experience had little impact on any of the eight mean subscale scores. In examining the actual mean stress scores, no discernible trends were evident in the data, suggesting that parttime nursing experience was not a factor in nurses' stress experiences. The anticipated differences in stress levels due to advanced years of nursing experience failed to materialize. Rather, the results were mixed except in the area of STRESS4. Here, results opposite to those expected

TABLE 21

Summary of Nursing Stress Scale Mean Score Variation by Years of Fulltime Experience

Nursing Stress Scale	Mean Stress Score				
	One Year	2-3 Years	4-5 Years	6-9 Years	10+ Years
STRESS1: Work Tasks/Roles	11.68	11.45	10.66	9.20	9.64
STRESS2: Personal/Professional Growth Opportunities	7.76	7.64	6.92	6.23	6.35
STRESS3: Social Support	1.61	1.41	1.74	1.39	1.63
STRESS4: Personal Economic Security	2.26	2.38	2.13[a]	1.97[b]	3.06[a,b]
STRESS5: Family Conflict	2.55	2.27	2.50	2.35	2.36
STRESS6: Job Satisfaction	2.37	2.29	2.57	2.19	2.10
STRESS7: Performance Appraisal	1.13	1.25	1.24	0.85	1.02
STRESS8: Physical Working Conditions	2.26	2.73	2.76	2.14	2.65

[a] Denotes a significant difference between pair at the 0.05 level. For example, for STRESS4, the mean stress score of the respondents with 4-5 years fulltime experience was significantly lower than that of respondents with 10 years or more experience.

[b] Denotes a significant difference between pair at the 0.05 level. For example, for STRESS4, the mean stress score of respondents with 6-9 years experience was significantly lower than the mean socre of respondents with 10 or more years experience.

TABLE 22

Summary of Nursing Stress Scale Mean Score Variation by Years of Parttime Nursing Experience

Nursing Stress Scale	Mean Stress Score			
	None	1-2 Years	3-5 Years	6+ Years
STRESS1: Work Tasks/Roles	10.57	11.21	8.92	7.44
STRESS2: Personal/Professional Growth Opportunities	7.00	7.03	6.76	4.38
STRESS3: Social Support	1.60	1.58	1.00	1.38
STRESS4: Personal Economic Security	2.42	2.64	1.76	2.13
STRESS5: Family Conflict	2.31	2.73	2.64	2.69
STRESS6: Job Satisfaction	2.28	2.42	2.32	2.25
STRESS7: Performance Appraisal	1.09	1.18	1.12	0.88
STRESS8: Physical Working Conditions	2.51	2.88	2.68	1.94

were observed. It is likely that the economic situation had a major impact on the observed findings.

Level of Education

A priori, it was expected that advanced educational preparation would attenuate the level of perceived stress. Examination of the results presented in Table 23, however, fail to confirm this consistently. Rather, for two major stress sources, that is STRESS4 and STRESS6, nurses with additional preparation scored significantly higher in some instances. In particular, significant between-group differences existed for STRESS4. Diploma nurses with additional courses were found to have significantly higher levels of STRESS4 than did either the registered nurses or those with advanced education. It is possible that nurses with additional courses but no degree were most acutely aware of the occupation's emphasis on upgrading to the bachelor's level and that this was reflected in their higher mean stress scores. With regard to the nurses' STRESS6 scores, the findings were unanticipated. Nurses with advanced education scored significantly higher than diploma nurses. This finding may have been due to unfulfilled job expectations and subsequent job dissatisfaction on the part of the more educated nurses.

Age Category

Examination of the scores reported in Table 24 shows that significant differences existed on only one stress subscale, STRESS4. Younger nurses (20-29) were found to have

TABLE 23

Summary of Nursing Stress Scale Mean Score Variation by Level of Education

Nursing Stress Scale		Mean Stress Score	
	R.N.	R.N. plus courses	B.Sc./M.Sc.
STRESS1: Work Tasks/Roles	10.81	9.62	10.03
STRESS2: Personal/Professional Growth Opportunities	6.64	7.10	7.14
STRESS3: Social Support	1.52	2.07	1.36
STRESS4: Personal Economic Security	2.25[a]	3.62[a,b]	2.14[b]
STRESS5: Family Conflict	2.42	2.69	2.24
STRESS6: Job Satisfaction	2.05[a]	2.64	2.58[a]
STRESS7: Performance Appraisal	1.01	1.31	1.14
STRESS8: Physical Working Conditions	2.48	2.88	2.45

[a] Denotes a significant difference between pair at the 0.05 level. For example, for STRESS4, the mean stress score of the R.N.'s is significantly lower than that of the R.N.'s who have additional courses to their credit.

[b] Denotes a significant difference between pair at the 0.05 level. For example, for STRESS4, the mean stress score of R.N.'s who have additional courses is significantly higher than that of university trained respondents.

TABLE 24

Summary of Nursing Stress Scale Mean Score Variation By Age Category (Years)

Nursing Stress Scale	Mean Stress Score 20-29	30-39	40-49	50+
STRESS1: Work Tasks/Roles	10.95	9.77	9.37	9.18
STRESS2: Personal/Professional Growth Opportunities	7.25	6.25	5.95	7.32
STRESS3: Social Support	1.49	1.36	2.10	1.73
STRESS4: Personal Economic Security	2.11[a,b]	2.42	3.07[a]	3.32[b]
STRESS5: Family Conflict	2.33	2.31	2.93	2.23
STRESS6: Job Satisfaction	2.37	2.19	1.93	2.64
STRESS7: Performance Appraisal	1.15	0.96	0.95	1.23
STRESS8: Physical Working Conditions	2.51	2.42	2.88	2.45

[a] Denotes a significant difference between pair at the 0.05 level. For example, for STRESS4, the mean score of 20-29 year old respondents was significantly lower than that of 40-49 year old respondents.

[b] Denotes a significant difference between pair at the 0.05 level. For example, for STRESS4, the mean score of 20-29 year old respondents was significantly lower than that of 50 year old and over respondents.

less stress due to STRESS4 than either the "40-49" year olds or those who were "50 or more". No other trends were discernable in the stress data, thus suggesting that age was not an important factor in nurses' perceptions of stress.

Marital Status

Examination of Table 25 reveals that differences in marital status accounted for differences in subscale scores. Single nurses had significantly higher mean scores for STRESS1 than did either married or separated (includes divorced and widowed) nurses. This finding is likely due to different job and life expectations. Furthermore, the STRESS4 mean scores were significantly higher for separated nurses as compared with single nurses, and as compared with married nurses. The differences observed were in the anticipated direction. Finally, single nurses had significantly less STRESS5 than either married or separated nurses, and single nurses had more stress due to STRESS7 than did married nurses.

Number of Dependents

Table 26 shows that the mean STRESS1 scores of the nurses with no dependents were significantly higher than those observed for nurses with two dependents. Reasons to explain this observation were unknown. Other significant differences that were observed were reported by nurses with more dependent responsibilities in the areas of STRESS4 and STRESS5.

TABLE 25

Summary of Nursing Stress Scale Mean Score Variation by Marital Status

Nursing Stress Scale	Mean Stress Score		
	Single	Married	Separated/Divorced/Widowed
STRESS1: Work Tasks/Roles	11.77[a,b]	9.72[a]	8.61[b]
STRESS2: Personal/Professional Growth Opportunities	7.44	6.52	6.65
STRESS3: Social Support	1.65	1.41	2.09
STRESS4: Personal Economic Security	2.29[a]	2.24[b]	3.91[a,b]
STRESS5: Family Conflict	1.88[a,b]	2.66[a]	2.78[b]
STRESS6: Job Satisfaction	2.46	2.18	2.35
STRESS7: Performance Appraisal	1.26[a]	1.00[a]	0.96
STRESS8: Physical Working Conditions	2.66	2.39	3.00

[a] Denotes a significant difference between pair at the 0.05 level. For example, for STRESS1, the mean score of single respondents was significantly higher than that of married nurses.

[b] Denotes a significant difference between pair at the 0.05 level. For example, for STRESS4, the mean score of married respondents was significantly lower than that of the separated/divorced/widowed nurses.

TABLE 26

Summary of Nursing Stress Scale Mean Score Variation by Number of Dependent Responsibilities

Nursing Stress Scale	Mean Stress Score			
	None	One	Two	Three+
STRESS1: Work Tasks/Roles	10.95^a	9.37	8.09^a	9.90
STRESS2: Personal/Professional Growth Opportunities	7.30	5.92	6.55	5.41
STRESS3: Social Support	1.46	1.67	1.39	2.17
STRESS4: Personal Economic Security	2.20^a	3.02^a	2.00	3.07
STRESS5: Family Conflict	2.20^a	2.61	2.82	3.10^a
STRESS6: Job Satisfaction	2.39	2.08	2.18	2.03
STRESS7: Performance Appraisal	1.14	0.96	1.03	0.97
STRESS8: Physical Working Conditions	2.54	2.45	2.42	2.69

[a] Denotes a significant difference between pair at the 0.05 level. For example, for STRESS1, the mean stress score of respondents with no dependents was significantly higher than the mean stress score of respondents who had two dependents.

In summary, the results of these analyses suggested that the nurses' socio-demographic characteristics were associated with significantly different mean stress scores for the specified environmental source. To assist in the interpretation of the findings, the following list of the nurses' eight major stress sources is provided:

- STRESS1: Work Tasks and Roles
- STRESS2: Personal/Professional Growth Opportunities
- STRESS3: Level of Social Support
- STRESS4: Personal Economic Security
- STRESS5: Family Conflicts
- STRESS6: Level of Job Satisfaction
- STRESS7: Performance Appraisal
- STRESS8: Adequacy of Physical Working Conditions

The results of the stress score variation analyses are as follows:

1. Nurses with long years (10 or more) of fulltime nursing experience had higher stress due to their level of STRESS4 than did nurses with either "4-5" or "6-9" years of fulltime nursing experience;
2. Parttime nursing experience did not appear to have any impact on the respondents' mean stress scores for all eight subscales;
3. Nurses with Bachelor's degrees had higher STRESS6 than did diploma prepared nurses;
4. Diploma nurses with additional courses but no degree had more stress due to STRESS4 when compared with either

R.N.'s without these courses, or with more prepared nurses;

5. Age did not have a major impact on any of the mean stress scores, except STRESS4. For this stress type, younger nurses experienced lower stress.
6. Marital status accounted for differences in mean scores for the following stress sources: STRESS1, STRESS4, STRESS5, and STRESS7; and
7. Nurses with no dependents experienced significantly more STRESS1 than nurses with two dependents; significantly less STRESS4 than those with one dependent; and significantly less STRESS5 than those with three or more dependents.

In conducting the above series of analyses, the effects of the independent variables were examined individually. It was thus impossible to examine their combined effects on the stress scores or their relative association with the stress scales. Consequently, as it was desirable to examine the effects of the independent variables simultaneously, multivariate analyses were carried out. In the following section, the results of the multivariate analysis are presented.

4.7 Multivariate Analysis of Stress Data

Determination of the explanatory variables that maximized prediction of the nurses' stress scores for each subscale and their stress manifestations was done using two multivariate statistical models; the multiple regression model was used for the first prediction, discriminant analysis for the second. The results of both sets of analyses are presented in the following sections.

4.7.1 Multiple Regression Analysis

In the following subsections, the results of the multiple regression analyses done for each stress subscale score are discussed. Eight summary tables (one for each subscale) illustrate the role of the environmental and socio-demographic characteristics (the independent variables) as explanatory variables. An explanation regarding the interpretation of these tables is provided prior to the discussion of the results.

Fifteen possible independent variables were allowed to be a determining factor in each linear regression equation. They are presented in their order of entry into the equation in the first column of the tables. As the objective of multiple regression analysis was to maximize the variation of the dependent variable explained by the regression equation, the first variables to enter the stepwise solution contribute the most in explaining the variation in the stress scores, subsequent variables contribute progressively smaller amounts. The R-square value shows the proportion of variation in the stress score that is explained with the addition of each independent variable. Consequently, in Table 27, the first variable to enter the equation (fulltime nursing experience) explained 3% of the variance in the

TABLE 27

Summary of Multiple Regression Analysis for STRESS1: Work Tasks/Roles

Independent Variables	R-Square[1]	Unstandardized Regression Coefficients[2]	Standardized Regression Coefficients[3]
Fulltime Experience	0.031	-0.356	-0.095
ICU	0.054	4.166	0.196
Surgical Unit	0.074	2.197	0.173
Marital Status	0.086	-1.065	-0.105
Emergency Unit	0.098	-1.948	-0.080
Paediatric Unit	0.106	2.347	0.116
Parttime Experience	0.111	-0.372	-0.061
Ob/Gyn Units	0.114	-0.407	-0.025
Medical Unit	0.116	1.274	0.081
Other Nursing Units	0.119	1.256	0.064
Level of Education	0.120	0.193	0.036
City of Employment	0.120	-0.174	-0.017
Age Category	0.120	0.069	0.013
Number of Dependents	0.120	-0.051	-0.010
(Constant)		11.367	

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[1] The R-square value represents the amount of variation in the dependent variable (the stress score) accounted for after the entry of an independent variable. For example, following the entry of the independent variable representing a surgical unit, approximately 7% (7.4%) of the variation in the dependent variable had been explained.

[2] The unstandardized regression coefficients represent the expected stress score difference due to one unit change in a particular environmental or socio-demographic variable. In order to determine a nurse's expected stress score, the unstandardized regression coefficient for marital status (-1.065) would be multiplied by the nurse's response for marital status, and then the resultant product would be added to the constant (11.367). As the unstandardized regression coefficient has a negative value, a change in marital status from nonmarried (0) to married (1) would lower the expected stress score.

[3] The standardized regression coefficients represent the relative contribution of each independent variable to variation in the dependent variable as the scales of the independent variables have been converted to a common scale i.e., Z scores. For example, an increase in a nurse's years of fulltime experience (-0.095) lowers the expected stress score more than an increase in the number of years of parttime experience (-0.061). Similarly, employment in ICU (0.196) raises the expected stress score more than employment on a surgical unit (0.173).

STRESS1 scores. With the inclusion of the variable representing ICU, an additional 2% of the variance was added, to account for 5% (5.4%) of the variance in the STRESS1 scores.

The unstandardized regression coefficients are presented in the third column. They represent the expected stress score difference due to one unit change in a particular environmental or socio-demographic variable. Consequently, a nurse's predicted stress score is derived by weighting the relevant independent variable response by the amount of the corresponding coefficient and adding the resultant product to the constant value. Thus, for example, the predicted STRESS1 score (Table 27) for a nurse employed in ICU would be the value of the unstandardized coefficient (4.166) multiplied by the dummy value (1) representing ICU employment, and then this product would be added to the constant (11.367). Except for the influence of random fluctuation due to sampling and measurement uncertainties, it was possible to 1) compare the effect of each independent variable on the expected stress score, and 2) estimate the expected change in the stress score when particular variables were operating in the nurse's environment.

The final column shows the standardized regression coefficients (β). They illustrate the relative contribution of each independent variable to variation in the stress scores as their scales have been converted to a common scale (i.e., Z scores). Consequently, Table 27 shows that an increase in a nurse's years of fulltime experience (-0.095) lowers the expected stress score more than an increase in the number of years of parttime experience (-0.061). Similarly, employment in ICU (0.196) raises the expected STRESS1 score more than employment on a surgical unit (0.173).

In the following subsections, the results presented in each summary table are highlighted.

STRESS1: Work Task and Role Stress Scores

As is shown in Table 27, the linear combination of fifteen independent variables accounted for 12% of the variation in the dependent variable. This value is quite low, indicating that the explanatory power of the environmental and socio-demographic factors was limited. Fulltime nursing experience was the first variable to enter the equation, accounting for 3% of the variation in the STRESS1 scores. It was followed by five dummy variables representing different types of specialty nursing units and marital status; jointly they contributed an additional 8% of the variation for a total variation explained of almost 11%. Parttime nursing experience was the next environmental variable to enter the prediction equation and it, in combination with the preceding variables, accounted for slightly over 11% of the variation in the dependent variable.

Examination of the unstandardized regression coefficients showed that employment in ICU (4.166) or on a surgical unit (2.197) substantially raised the expected STRESS1 score; being married (-1.065) or employed on an emergency unit (-1.948) lowered the predicted scores.

Column 4 shows the β coefficients for each predictor variable. Employment in ICU, surgery, paediatrics, medicine and other nursing units (such as auxillary) all raised the predicted STRESS1 score. ICU nursing had the largest effect, other types of nursing units the least. Only two nursing specialties had the effect of lowering the predicted STRESS1 score, emergency and obstetrical and gynecological nursing. Increases in the number of years of fulltime and parttime nursing experience both had the effect of lowering the predicted score although fulltime work experience had the greater impact. Increased age (0.013) raised the expected score but its influence was less than the effect of fulltime experience (-0.095).

STRESS2: Personal and Professional Growth Stress Scores

Examination of Table 28 illustrates that a combination of the fifteen independent variables explained 11% of the variation in the nurses' STRESS2 scores. The explanatory power of these variables was thus quite low. The emergency unit variable was the first to enter (accounting for 4% of the variation), followed by the number of dependents (accounting for almost 3% of the variation). The reasons why these variables entered the prediction equation first and second are unknown.

TABLE 28

Summary of Multiple Regression Analysis for STRESS2: Personal/Professional Growth Opportunities

Independent Variables	R-Square[1]	Unstandardized Regression Coefficients[2]	Standardized Regression Coefficients[3]
Emergency Unit	0.044	-2.681	-0.141
Number of Dependents	0.069	-0.329	-0.082
Fulltime Experience	0.079	-0.374	-0.127
Surgical Unit	0.086	2.067	0.209
Level of Education	0.091	0.608	0.144
Medical Unit	0.096	1.644	0.134
Marital Status	0.099	-0.424	-0.054
Other Nursing Units	0.101	-0.349	-0.023
City of Employment	0.104	-0.802	-0.100
Age Category	0.105	0.353	0.083
Parttime Experience	0.107	-0.246	-0.051
Psychiatry Unit	0.108	1.309	0.081
ICU	0.109	1.269	0.077
Paediatric Unit	0.111	1.156	0.073
Ob/Gyn Units	0.113	0.765	0.060
(Constant)		6.755	

[1,2,3] See Table 27 for an explanation of the interpretation of each value.

Analysis of the standardized regression coefficients revealed that employment on a surgical or a medical unit were associated with the highest predicted stress scores, while emergency nursing lowered the expected STRESS2 score almost as much as medical nursing raised it. All hospital nursing specialties raised the expected STRESS2 score except emergency and other units, that included auxillary and rehabilitation. As community health nursing was used as the reference category for the clinical specialty variable, these results suggest that community nursing is associated with lower predicted STRESS2 scores.

STRESS3: Social Support Stress Scores

The results presented in Table 29 show that the combination of fifteen predictor variables explained very little of the variation in the STRESS3 (8%). Examination of the unstandardized coefficients revealed that ICU, paediatric and surgical nursing were the only clinical specialties to raise the expected STRESS3 score. More dependents and increased age also had the effect of raising the expected score. Examination of the β coefficients shows that the relative contribution of each independent variable for explaining variation in the STRESS3 scores was low. An increase in the number of dependents raised the expected STRESS3 score the most, an increase in parttime experience lowered it the most. A change in marital status, from unmarried to married, also had the effect of lowering the expected STRESS3 score but its influence was less than that

TABLE 29

Summary of Multiple Regression Analysis for STRESS3: Social Support

Independent Variables	R-Square[1]	Unstandardized Regression Coefficients[2]	Standardized Regression Coefficients[3]
Medical Unit	0.010	-0.424	-0.084
Number of Dependents	0.019	0.347	0.210
Parttime Experience	0.039	-0.328	-0.167
Marital Status	0.058	-0.438	-0.135
ICU	0.065	0.703	0.103
Paediatric Unit	0.069	0.527	0.081
Age Category	0.072	0.181	0.103
Fulltime Experience	0.074	-0.068	-0.056
Surgical Unit	0.075	0.169	0.041
City of Employment	0.077	-0.107	-0.032
Emergency Unit	0.077	-0.189	-0.024
Psychiatry Unit	0.078	-0.158	-0.024
Ob/Gyn Units	0.078	-0.086	-0.016
(Constant)		1.984	

[1,2,3] See Table 27 for an explanation of the interpretation of each value.

of parttime experience.

STRESS4: Personal Economic Security Stress Scores

Examination of Table 30 reveals that a limited amount of the variation in the nurses' STRESS4 scores was explained by a linear combination of the independent variables (9%). The first four variables to enter the equation were socio-demographic characteristics, and together they explained 7% of the total variation accounted for by all the predictor variables.

Analysis of the β regression coefficients showed that as expected, older nurses had the highest predicted STRESS4 scores and those with more parttime experience were associated with the lowest expected scores. Employment in the hospital setting generally lowered the expected STRESS4 score although paediatric, surgical and emergency nursing were associated with minor increases in STRESS4 scores.

STRESS5: Family Conflict Stress Scores

Table 31 shows that a linear combination of fifteen independent variables explained almost 14% of the variation in the STRESS5 scores. While still modest, the explanatory value of the predictor variables for this particular stressor was higher than for previous or subsequent stress subscales. Marital status was the first variable to enter the prediction equation followed by the variable representing number of dependents. Being married and having more dependents raised the predicted STRESS5 score, although

TABLE 30

Summary of Multiple Regression Analysis for STRESS4: Personal Economic Security

Independent Variables	R-Square[1]	Unstandardized Regression Coefficients[2]	Standardized Regression Coefficients[3]
Age Category	0.036	0.482	0.232
Parttime Experience	0.057	-0.432	-0.185
Number of Dependents	0.062	0.266	0.136
Marital Status	0.073	-0.371	-0.096
Surgical Unit	0.076	0.260	0.054
Ob/Gyn Units	0.079	-0.350	-0.056
Paediatric Unit	0.081	0.306	0.040
City of Employment	0.082	-0.135	-0.035
ICU	0.083	-0.297	-0.037
Medical Unit	0.084	-0.219	-0.037
Fulltime Experience	0.084	-0.054	-0.037
Emergency Unit	0.085	0.118	0.013
Other Nursing Units	0.085	-0.074	-0.010
Level of Education	0.085	-0.019	-0.009
(Constant)		2.512	

[1,2,3] See Table 27 for an explanation of the interpretation of each value.

TABLE 31

Summary of Multiple Regression Analysis for STRESS5: Family Conflict

Independent Variables	R-Square[1]	Unstandardized Regression Coefficients[2]	Standardized Regression Coefficients[3]
Marital Status	0.043	0.500	0.163
Number of Dependents	0.059	0.261	0.167
ICU	0.078	1.413	0.220
Paediatric Unit	0.093	1.292	0.210
City of Employment	0.107	-0.531	-0.170
Surgical Unit	0.116	0.593	0.154
Other Nursing Units	0.126	0.717	0.121
Fulltime Experience	0.130	-0.110	-0.097
Ob/Gyn Units	0.133	0.399	0.080
Age Category	0.135	0.114	0.069
Emergency Unit	0.137	0.375	0.051
Psychiatry Unit	0.137	0.146	0.023
Medical Unit	0.137	0.123	0.026
Level of Education	0.137	0.034	0.020
Parttime Experience	0.137	-0.017	-0.009
(Constant)		1.871	

[1,2,3] See Table 27 for an explanation of the interpretation of each value.

their relative contribution was not as high as ICU and paediatric nursing employment. Furthermore, review of the β coefficients shows that all hospital nursing was associated with increased predicted STRESS5 scores. Community health nursing was the reference category for the clinical specialty variable, thus suggesting that it was associated with lower STRESS5 scores. Examination of the other socio-demographic predictor variables showed that being older and more educated also raised the predicted score.

STRESS6: Job Satisfaction Stress Scores

As shown in Table 32, a linear combination of fifteen predictor variables accounted for 10% of the variation in the nurses' STRESS6 scores. This is very low. The predictor variable, level of education, was the first to enter the regression equation and accounted for almost 3% of the explained variation. Its β coefficient of 0.046 indicates that more education raises the expected STRESS6 score. One other socio-demographic variable, parttime nursing experience had a similar effect; the other socio-demographic characteristics, that is being married, more fulltime experience, more dependents, and being older, all lowered the expected STRESS6 score.

Examination of the environmental predictor variables showed that they all lowered the expected STRESS6 score. Consequently, employment in Edmonton, or on any of the selected hospital nursing units, had the effect of reducing stress associated with job satisfaction. The β coefficients

TABLE 32

Summary of Multiple Regression Analysis for STRESS6: Job Satisfaction

Independent Variables	R-Square[1]	Unstandardized Regression Coefficients[2]	Standardized Regression Coefficients[3]
Level of Education	0.029	0.072	0.046
Marital Status	0.044	-0.287	-0.098
Ob/Gyn Units	0.054	-0.915	-0.193
Emergency Unit	0.065	-1.108	-0.158
City of Employment	0.070	-0.096	-0.032
Fulltime Experience	0.073	-0.074	-0.068
Other Nursing Units	0.077	-0.651	-0.115
Parttime Experience	0.079	0.118	0.067
Number of Dependents	0.081	-0.105	-0.071
Surgical Unit	0.083	-0.582	-0.159
Medical Unit	0.086	-0.604	-0.133
ICU	0.091	-0.728	-0.119
Paediatric Unit	0.094	-0.447	-0.076
Psychiatry Unit	0.095	-0.198	-0.033
Age Category	0.095	-0.033	-0.021
(Constant)		3.012	

[1,2,3] See Table 27 for an explanation of the interpretation of each value.

show that nursing on obstetrical and gynecological and surgical units was associated with the lowest predicted STRESS6 when compared to the other hospital specialties. Again, as community health was the reference category for clinical specialty, it was associated with higher STRESS6 scores.

STRESS7: Performance Appraisal Stress Scores

Examination of Table 33 shows that a linear combination of all variables but the variables representing surgical units and number of dependents, accounted for only 7% of the variation in predicted STRESS7 scores. As this is extremely limited, the regression coefficients must be evaluated with caution. The results show that being married reduced the predicted STRESS7 scores, while having more education and being older raised the expected scores. The β coefficients show that work on psychiatry had the greatest impact on the STRESS7 scores, and that its effect was to lower the predicted score.

STRESS8: Physical Working Condition Stress Scores

The final summary table (Table 34) shows that the linear regression equation explained 12% of the variation in nurses' STRESS8 scores. Comparing the β coefficients showed that paediatric units were associated with the highest expected scores, while being married had the effect of lowering the STRESS8 score the most. Except for psychiatry and obstetrical and gynecological nursing, which lowered the predicted score, all hospital nursing specialties elevated

TABLE 33

Summary of Multiple Regression Analysis for STRESS7: Performance Appraisal

Independent Variables	R-Square[1]	Unstandardized Regression Coefficients[2]	Standardized Regression Coefficients[3]
Marital Status	0.013	-0.181	-0.099
Paediatric Unit	0.023	0.276	0.075
Level of Education	0.033	0.089	0.091
Fulltime Experience	0.042	-0.071	-0.105
Psychiatry Unit	0.050	-0.446	-0.119
Ob/Gyn Units	0.057	-0.299	-0.101
Other Nursing Units	0.063	-0.260	-0.074
City of Employment	0.065	0.107	0.058
Medical Unit	0.067	-0.113	-0.040
Parttime Experience	0.068	0.032	0.029
ICU	0.069	0.139	0.036
Age Category	0.070	0.033	0.033
Emergency Unit	0.070	-0.065	-0.015
(Constant)		1.194	

[1,2,3] See Table 27 for an explanation of the interpretation of each value.

TABLE 34

Summary of Multiple Regression Analysis for STRESS8: Physical Working Conditions

Independent Variables	R-Square[1]	Unstandardized Regression Coefficients[2]	Standardized Regression Coefficients[3]
Paediatric Unit	0.039	1.360	0.203
ICU	0.073	1.433	0.205
City of Employment	0.082	0.391	0.115
Psychiatry Unit	0.090	-0.571	-0.084
Ob/Gyn Units	0.097	-0.314	-0.058
Age Category	0.105	0.143	0.079
Marital Status	0.110	-0.343	-0.103
Level of Education	0.115	0.193	0.108
Number of Dependents	0.119	0.140	0.083
Surgical Unit	0.121	0.249	0.060
Other Nursing Units	0.121	0.185	0.029
Emergency Unit	0.121	0.130	0.016
Parttime Experience	0.121	-0.027	-0.013
Medical Unit	0.121	0.057	0.011
Fulltime Experience	0.121	-0.011	-0.009
(Constant)		1.815	

[1,2,3] See Table 27 for an explanation of the interpretation of each value.

the predicted STRESS8 score. Community health nursing was used as the reference category, and consequently was found to be associated with lower STRESS8 scores. This suggests, therefore, that community nurses are less stressed by their working conditions than hospital nurses.

Summary of Multiple Regression Analyses for Stress Scales

In summary, the results of eight regression analyses for each of the eight nursing stress scales were presented. In all of them, the obtained R-square value was low, indicating that the combination of fifteen predictor variables did not adequately explain the variation in the nurses' stress scores. Conclusions based on these findings must be viewed cautiously, therefore.

Pertinent findings from the series of multiple regression analyses are summarized below.

Environmental Variables

1. Employment in Edmonton *lowered* the expected stress scores for all scales but STRESS7 and STRESS8; these it raised;
2. Hospital nursing *raised* the expected stress scores for the following scales: STRESS1, STRESS2, STRESS5, and STRESS8;
3. Hospital nursing *lowered* the expected stress scores for STRESS6 and STRESS7;
4. ICU, paediatric, and surgical units were associated with *higher* stress scores for most of the stress scales except STRESS6, which were lower; and

5. Obstetrical and gynecological nursing units had the effect of *lowering* the expected scores for all scales except STRESS2 and STRESS5, which they raised.

Socio-demographic Variables

1. More years of fulltime nursing experienced *lowered* the expected stress scores for all scales, and more parttime experience had a similar effect for most scales;
2. Added educational preparation *raised* all scores except STRESS3 and STRESS4;
3. Increased age *raised* all the predicted scores except STRESS6; and
4. Being married *lowered* the expected scores for all stressors except STRESS5, which it raised.

One final regression analysis was done to determine the explanatory value of the eight subscale scores in accounting for differences in the nurses' rates of absenteeism. The results of this analysis are summarized in Table 35 and the discussion follows.

Number of Absenteeism Episodes

The amount of variation in the dependent variable (number of absenteeism episodes) accounted for by a linear combination of eight subscale scores did not exceed 5%. This indicated that their explanatory value was very limited and therefore the regression coefficients must be interpreted cautiously. The first variable to enter the prediction equation was STRESS4 (accounting for 1% of the variation explained), followed by STRESS6 and STRESS8. They accounted

TABLE 35

Summary of Multiple Regression Analysis for Number of Absenteeism Episodes

Independent Variables	R-Square[1]	Unstandardized Regression Coefficients[2]	Standardized Regression Coefficients
STRESS4: Personal Economic Security	0.012	0.048	0.126
STRESS6: Job Satisfaction	0.033	-0.085	-0.170
STRESS8: Physical Working Conditions	0.037	-0.045	-0.101
STRESS1: Work Tasks/Roles	0.043	0.013	0.090
STRESS3: Social Support	0.046	0.023	0.052
STRESS5: Family Conflict	0.048	0.020	0.041
STRESS2: Personal/Professional Growth Opportunities	0.049	-0.008	-0.045
STRESS7: Performance Appraisal	0.049	0.015	0.019
(Constant)		1.933	

[1] The R-square value represents the amount of variation in the dependent variable (the number of absences) accounted for after the entry of an independent variable. For example, following the entry of the independent variable representing STRESS1, approximately 4% (4.3%) of the variation in the dependent variable had been explained.

[2] The unstandardized regression coefficients represent the expected differences in a nurse's number of absences due to one unit change in a stress score. In order to determine a nurse's expected absenteeism rate, the unstandardized regression coefficient for STRESS4 (0.048) is multiplied by the nurse's score for STRESS4, and then the resultant product would be added to the constant (1.933).

[3] The standardized regression coefficients represent the relative contribution of each independent variable to variation in the dependent variable as the scales of the independent variables have been converted to a common scale i.e., Z scores. For example, an increase in the STRESS4 score (0.126) raises the expected absenteeism rate more than an increase in the STRESS1 score (0.090). Similarly, an increase in the STRESS6 score (-0.170) lowers the expected absenteeism rate more than an increase in the STRESS2 score (-0.045).

for an additional 2% and 0.4% of the variation respectively.

Examination of the β regression coefficients showed that STRESS1 and STRESS4 were associated with the highest absenteeism rates, while stress due to STRESS6 and STRESS8 were associated with the lowest rates. An increase in the STRESS4 score would raise the predicted rate of absenteeism more than an increase in the STRESS1 score, while an increase in the STRESS6 score would lower the expected absenteeism rate more than increases in either STRESS8 or STRESS2 scores.

In summary, it was evident that the STRESS4, STRESS6, and STRESS8 scales provided the greatest explanation of differences in nurses' rates of absenteeism. Furthermore, no stress subscale score accounted for a substantial proportion of the variation in the dependent variable. Consequently, nurses' absenteeism rates cannot be adequately explained in terms of their stress subscale scores.

4.7.2 Discriminant Analysis

Discriminant analysis was used to identify the linear combination of independent variables (the subscale scores) that maximally distinguished between two groups of respondents; those who exhibited a particular stress manifestation, and those who did not. Fourteen summary tables (one for each possible stress manifestation) identify the stress subscales most closely associated with each group. An explanation regarding the interpretation of these tables is provided prior to the discussion of results.

The eight stress scales were allowed to be attribute variables or independent variables in the discriminant functions. They are presented in their order of entry into the function in the first column of the tables. Similar to the multiple regression equation, the first variable to enter the stepwise solution contributes most to the differentiation between groups. Subsequent variables had lesser quantitative influences on the discriminating function. The maximum number of discriminant functions which could be derived was one less than the number of groups; therefore, only one discriminant function was obtained for each stress manifestation variable. The second column shows the standardized discriminant coefficients. They represent the relative contribution of each independent variable to the discrimination between groups. Like the regression β coefficients, each relevant subscale score (standardized) is weighted by the amount of the coefficient and added to derive a discriminant score for each case. Group membership could then be predicted by comparing the discriminant score with the group mean score. For each stress manifestation, the group mean scores (group centroids) are reported on the table. Table 36, for example, shows the group centroids for the two groups of nurses; those who exhibit fatigue, and those who do not. A high predicted discriminant score is associated with the fatigued group, a low discriminant score is associated with the not fatigued group. Furthermore, for

TABLE 36

Summary of Discriminant Analysis for Stress Response, Fatigue[1]

Step	Independent Variables	Standardized Discriminant Coefficients[2]	Wilks' Lambda[3]
1	STRESS3: Social Support	0.603	0.959
2	STRESS4: Personal Economic Security	0.592	0.943

[1] The group centroids in terms of the discriminant scores are:

Fatigue	Yes	0.193
	No	-0.314

For example, a high discriminant score is associated with the fatigued group, whereas a lower discriminant score is associated with the no fatigue group.

[2] The standardized discriminant coefficients are applicable to Z scores or standardized attribute variables. The positive value for both coefficients indicates that an increase in either stress score raises the discriminant score; a negative value would have the opposite effect.

[3] Wilks' lambda is a multivariate generalization of sums of squares within divided by total sums of squares, ranges 0 to 1, and represents an inverse measure of the discriminating power of the combination of independent variables. For example, the high value of the final Wilks' lambda, which is very close to 1.0, indicates that the independent variables used have little power to discriminate between the groups of nurses.

all subsequent stress manifestations, a high discriminant score is associated with the group of nurses who exhibit more of the particular manifestation, and a low discriminant score is associated with the group of nurses who exhibit less of it.

The final column shows the Wilks' lambda associated with each independent variable. The discriminant process involved the selection of independent variables until the minimization of Wilks' lambda became nonsignificant. Consequently, Table 36 shows that two of the eight independent variables were selected before Wilks' lambda became nonsignificant. As Wilks' lambda ranges 0 and 1 and represents an inverse measure of the discriminating power' of each independent variable, the high value of the final Wilks' lambda, which is very close to 1.0, indicates that both stress scales have little power to discriminate between the groups of nurses.

In subsequent subsections, the results presented in each summary table are reviewed.

More Fatigue

Table 36 illustrates the most influential subscale scores to differentiate between more or less fatigued nurses. Examination of the standardized discriminant coefficients reveals that stress due to STRESS3 and STRESS4 contributed relatively equally to the discrimination. Furthermore, as both coefficients had similar signs, they

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'A multivariate generalization of within group sums of squares divided by total sums of squares.

raised the discriminant score and thus were associated with the group of nurses who experienced fatique. The Wilks' lambda for both independent variables was high, indicating that both had little power to discriminate between groups, and therefore results must be interpreted cautiously. Despite this limitation, the findings suggest that personal stressors were most influential in explaining the stress response of fatigue.

Irritability

Examination of Table 37 reveals that a linear combination of four subscale scores provided maximum discrimination between irritable and nonirritable nurses. The stress associated with STRESS3 provided the greatest differentiation, the stress due to STRESS8 the least. In fact, review of the standardized discriminant coefficients shows that STRESS3 was more than twice as important as STRESS8. Furthermore, the negative coefficient for STRESS8 had the effect of lowering the derived discriminant score and thus a high positive STRESS8 score was associated with the nurses who experienced the least irritability. STRESS5 and STRESS1 were second and third in importance to the explanation of nurses' emotional response. Consequently, these results suggest that non-occupational stressors were most influential in explaining why nurses were irritable. However, as the value of the final Wilks' lambda (0.921) remained high, all four independent variables had little discriminating power and therefore conclusions based on

TABLE 37

Summary of Discriminant Analysis for Stress Response, Irritability[1]

Step	Independent Variables	Standardized Discriminant Coefficients	Wilks' Lambda
1	STRESS3: Social Support	0.570	0.945
2	STRESS5: Family Conflict	0.454	0.931
3	STRESS1: Work Tasks/Roles	0.388	0.924
4	STRESS8: Physical Working Conditions	-0.211	0.921

[1] The group centroids in terms of discriminant scores are:

Irritability	Yes	0.295
	No	-0.290

Refer to Table 36 for interpretation.

these results must be interpreted cautiously.

Time Pressure

The results summarized in Table 38 indicate that STRESS5 and STRESS1 best explained whether or not nurses felt time-pressured. As stress from these sources increased, the discriminant score was raised and this was associated with feeling time pressure. STRESS2, STRESS8, and STRESS7 contributed relatively little to the discriminant function. Furthermore, examination of the discriminant coefficients reveals that STRESS2 and STRESS8 lowered the discriminant score and thus high scores of these were associated with feeling less time pressure. The value of the final Wilks' lambda was high, again suggesting caution in the interpretation of findings.

Increased Consumption of Coffee

Analysis of Table 39 reveals that whether or not a nurse consumes more coffee is best differentiated by knowledge of that nurse's STRESS4 score. An increase in the STRESS4 score is associated with a higher discriminant score, and thus more coffee consumption. STRESS5 and STRESS2 contributed relatively modest but opposite effects to the discrimination between groups. Consequently, a high STRESS5 score is associated with a high discriminant score, and thus more coffee consumption, and STRESS2 has the opposite effect. These findings indicate that personal stressors are most predictive of nurses' coffee consumption response. As previously, the value of the final Wilks' lambda was high,

TABLE 38

Summary of Discriminant Analysis for Stress Response, Time Pressure[1]

Step	Independent Variables	Standardized Discriminant Coefficients	Wilks' Lambda
1	STRESS5: Family Conflict	0.689	0.962
2	STRESS1: Work Tasks/Roles	0.688	0.944
3	STRESS2: Personal/Professional Growth Opportunities	-0.355	0.941
4	STRESS8: Physical Working Conditions	-0.284	0.937
5	STRESS7: Performance Appraisal	0.288	0.933

[1] The group centroids in terms of discriminant scores are:

Time Pressure	Yes	0.228
	No	-0.311

Refer to Table 36 for interpretation.

TABLE 39

Summary of Discriminant Analysis for Stress Response, More Coffee[1]

Step	Independent Variables	Standardized Discriminant Coefficients	Wilks' Lambda
1	STRESS4: Personal Economic Security	0.765	0.961
2	STRESS5: Family Conflict	0.485	0.952
3	STRESS2: Personal/Professional Growth Opportunities	-0.404	0.944

[1] The group centroids in terms of discriminant scores are:

More Coffee	Yes	0.571
	No	-0.103

Refer to Table 36 for interpretation.

indicating that variables other than those selected may have contributed more to the explanation of between-group differences.

Feeling of Job Dissatisfaction

While Table 40 indicates that four subscale scores contributed to the differentiation between job satisfied and job dissatisfied nurses, clearly the stress due to STRESS2 was most associated with the nurses who experienced job dissatisfaction. Its contribution was at least four times greater than the other variables; furthermore, the reduction in Wilks' lambda caused by the introduction of the final three variables was minimal. The value of the final Wilks' lambda remained quite high, however, indicating that other, more discriminating variables were as yet unidentified.

Forgetfulness

Table 41 shows that the STRESS3 score was most influential in differentiating between nurses on the basis of forgetfulness, STRESS7 the least. The results show that social and home environmental stressors were associated with experiencing forgetfulness, but the high value of the final Wilks' lambda indicates that considerable discriminating power was unexplained.

Insomnia

Examination of Table 42 shows that nurses' experience of insomnia was best explained by STRESS4, STRESS5, and STRESS8. Again, personal stressors were associated with a high discriminant score and thus greater insomnia. As

TABLE 40

Summary of Discriminant Analysis for Stress Response, Job Dissatisfaction[1]

Step	Independent Variables	Standardized Discriminant Coefficients	Wilks' Lambda
1	STRESS2: Personal/Professional Growth Opportunities	0.999	0.858
2	STRESS7: Performance Appraisal	-0.228	0.854
3	STRESS1: Work Tasks/Roles	0.223	0.850
4	STRESS4: Personal Economic Security	-0.175	0.846

---

[1] The group centroids in terms of discriminant scores are:

Job Dissatisfaction	Yes	0.468
	No	-0.387

Refer to Table 36 for interpretation.

TABLE 41

Summary of Discriminant Analysis for Stress Response, Forgetfulness[1]

Step	Independent Variables	Standardized Discriminant Coefficients	Wilks' Lambda
1	STRESS3: Social Support	0.693	0.946
2	STRESS5: Family Conflict	0.497	0.933
3	STRESS7: Performance Appraisal	-0.228	0.930

---

[1] The group centroids in terms of discriminant scores are:

Forgetfulness	Yes	0.483
	No	-0.154

Refer to Table 36 for interpretation.

TABLE 42

Summary of Discriminant Analysis for Stress Responde, Insomnia[1]

Step	Independent Variables	Standardized Discriminant Coefficients	Wilks' Lambda
1	STRESS4: Personal Economic Security	0.841	0.959
2	STRESS5: Family Conflict	0.363	0.955
3	STRESS8: Physical Working Conditions	-0.255	0.952

---

[1] The group centroids in terms of the discriminant scores are:

Insomnia	Yes	0.402
	No	-0.125

Refer to Table 36 for interpretation.

previously, however, Wilks' lambda remained high suggesting low discriminating power in the independent variables used.

Thoughts of Leaving Job

Review of Table 43 reveals that stress from STRESS2 and STRESS5 had the most influence on distinguishing between those nurses who thought of leaving their jobs and those who did not. The influence of STRESS2 was double that of STRESS5, suggesting that nurses contemplate resigning from unchallenging jobs. This finding tends to corroborate the evidence reported by Mobley, Horner and Hollingsworth (1978), that intention to quit was influenced by job satisfaction. Furthermore, this interpretation is strengthened by the recognition that professional development opportunities are an important job value held by nurses (AHA, 1980), and thus are a strong component of job satisfaction (Locke, 1976). An increase in the STRESS4 score lowered the discriminant score, and this was associated with the group of nurses who did not think of quitting. However, as the value of the final Wilks' lambda remained high, findings must be interpreted cautiously.

Increased Consumption of Alcohol/Drugs

Table 44 illustrates that whether or not a nurse consumes more alcohol or drugs is strongly predicted by the STRESS3 score. Consequently, more STRESS3 is associated with a higher discriminant score and thus more alcohol consumption. The STRESS8 score had a moderate lowering effect on the discriminant score and thus was associated

TABLE 43

Summary of Discriminant Analysis for Stress Response, Thoughts of Resigning[1]

Step	Independent Variables	Standardized Discriminant Coefficients	Wilks' Lambda
1	STRESS2: Personal/Professional Growth Opportunities	0.800	0.931
2	STRESS5: Family Conflict	0.464	0.920
3	STRESS4: Personal Economic Security	-0.307	0.914
4	STRESS7: Performance Appraisal	0.201	0.912

[1] The group centroids in terms of discriminant scores are:

Thoughts of Resigning	Yes	0.342
	No	-0.282

Refer to Table 36 for interpretation.

TABLE 44

Summary of Discriminant Analysis for Stress Response, More Alcohol[1]

Step	Independent Variables	Standardized Discriminant Coefficients	Wilks' Lambda
1	STRESS3: Social Support	0.902	0.973
2	STRESS8: Physical Working Conditions	-0.507	0.967
3	STRESS1: Work Tasks/Roles	0.341	0.964

---

[1] The group centroids in terms of discriminant scores are:

More Alcohol	Yes	0.875
	No	-0.042

Refer to Table 36 for interpretation.

with the group of nurses who consumed less alcohol. The power of these discriminating variables was limited, however, as reflected in the high value of the final Wilks' lambda.

More Aches, Pain, and Flu

Table 45 shows that the nurses' STRESS4 score contributed strongly to the differentiation as to whether or not more aches, pains and flu were experienced. Four other discriminating variables were included in the equation before Wilks' lambda became insignificant. Three had low positive effects on the discriminant score, and one, STRESS6, lowered the discriminant score and thus was associated with the group of nurses who did not experience these somatic complaints. Despite the high value of the final Wilks' lambda, four of the five discriminating variables suggest that personal stress factors are most predictive of nurses' minor physical complaints.

Increased Use of Cigarettes

As illustrated in Table 46, the STRESS1 score contributed substantially to the differentiation between nurses who smoked more or less cigarettes. Of the additional three discriminating variables, two reflected stress arising from the work environment. These findings suggest that occupational stressors are most predictive of the nurses' behavioral stress response, increased cigarette usage. Except for STRESS2, the STRESS1, STRESS4, and STRESS7 scores were associated with the group of nurses who smoked more

TABLE 45

Summary of Discriminant Analysis for Stress Response, More Aches[1]

Step	Independent Variables	Standardized Discriminant Coefficients	Wilks' Lambda
1	STRESS4: Personal Economic Security	0.746	0.930
2	STRESS3: Social Support	0.236	0.922
3	STRESS6: Job Satisfaction	-0.366	0.917
4	STRESS1: Work Tasks/Roles	0.256	0.912
5	STRESS5: Family Conflict	0.226	0.909

---

[1] The group centroids in terms of discriminant scores are:

More Aches	Yes	0.861
	No	-0.115

Refer to Table 36 fcr interpretation.

TABLE 46

Summary of Discriminant Analysis for Stress Response, More Cigarettes[1]

Step	Independent Variables	Standardized Discriminant Coefficients	Wilks' Lambda
1	STRESS1: Work Tasks/Roles	0.830	0.980
2	STRESS4: Personal Economic Security	0.412	0.976
3	STRESS2: Personal/Professional Growth Opportunities	-0.501	0.973
4	STRESS7: Performance Appraisal	0.377	0.970

[1] The group centroids in terms of discriminant scores are:

More Cigarettes	Yes	0.545
	No	-0.057

Refer to Table 36 for interpretation.

cigarettes.

Depression

Table 47 shows that whether or not a nurse feels depressed is best differentiated by her STRESS3 score. It substantially raised the discriminant score and thus was associated with the nurses who felt most depressed. Three other discriminating variables were identified, and all reflected occupational stressors. Examination of their standardized discriminant coefficients reveals that all had a low influence on the discrimination. It was interesting that an increase in the STRESS7 score was associated with less depression, and an increase in the STRESS2 score was associated with more depression. The reasons are unknown.

Anxiety

Examination of Table 48 shows that five independent variables differentiated between anxious and nonanxious nurses. Compared with previous analyses, the lower value of the final Wilks' lambda obtained here indicates that more discriminating power existed in this combination of variables for this particular psychological stress response. STRESS3 and STRESS5 had the greatest influence on the discriminant function, STRESS4 the least. The results suggest that stress associated with nonwork interpersonal relationships contributed most to the prediction of nurses' anxiety response. Consequently, increases in the STRESS3 and STRESS5 scores were associated with more anxiety, and an increased STRESS8 score was associated with the group of

TABLE 47

Summary of Discriminant Analysis for Stress Response, Depression[1]

Step	Independent Variables	Standardized Discriminant Coefficients	Wilks' Lambda
1	STRESS3: Social Support	0.968	0.859
2	STRESS7: Performance Appraisal	-0.329	0.850
3	STRESS2: Personal/Professional Growth Opportunities	0.303	0.844
4	STRESS8: Physical Working Conditions	-0.197	0.840

---

[1] The group centroids in terms of the discriminant scores are:

Depression	Yes	0.830
	No	-0.229

Refer to Table 36 for interpretation.

TABLE 48

Summary of Discriminant Analysis for Stress Response, Anxiety[1]

Step	Independent Variables	Standardized Discriminant Coefficients	Wilks' Lambda
1	STRESS3: Social Support	0.526	0.928
2	STRESS5: Family Conflict	0.400	0.912
3	STRESS2: Personal/Professional Growth Opportunities	0.373	0.901
4	STRESS8: Physical Working Conditions	-0.353	0.890
5	STRESS4: Personal Economic Security	0.195	0.887

---

[1] The group centroids in terms of discriminant scores are:

Anxiety	Yes	0.527
	No	-0.241

Refer to Table 36 for interpretation.

nurses who were less anxious.

Less Leisure Time Available

As expected, Table 49 shows that the STRESS5 scores almost entirely explained whether or not a nurse experienced less available leisure time. STRESS2 contributed to the discrimination as well, but in a relatively minor and opposite way. Thus, more STRESS2 was associated with a lower discriminant score and thus the group of nurses who had leisure time. The final value of Wilks' lambda was high, however, indicating that both variables had low discriminating power.

Summary of Discriminant Analysis

Analysis of the predominant discriminating variables for all the stress manifestations revealed that three personal environmental stressors were most influential in the following order:

- STRESS3 (social support);
- STRESS4 (personal economic security); and
- STRESS5 (family conflict).

The major influence of personal environmental stress factors and, in comparison, the relatively minor role of work stressors was unexpected. STRESS8 and STRESS7 had the least influence on the fourteen discriminations. This was expected as neither stressor was emphasized in the literature reviewed.

When the findings were examined according to the stressors that were most discriminating for behavioral,

TABLE 49

Summary of Discriminant Analysis for Stress Response, Less Leisure Time[1]

Step	Independent Variables	Standardized Discriminant Coefficients	Wilks' Lambda
1	STRESS5: Family Conflict	1.022	0.855
2	STRESS2: Personal/Professional Growth Opportunities	-0.226	0.849

[1] The group centroids in terms of the discriminant scores are:

Less Leisure Time	Yes	0.533
	No	-0.332

Refer to Table 36 for interpretation.

psychological, and physical stress manifestations, several patterns emerged. For the *behavioral* stress responses, which included consumption of more coffee, alcohol and cigarettes, insomnia, and forgetfulness, three environmental stressors provided maximum discrimination in the following order:

- STRESS4 (personal economic security);
- STRESS3 (social support); and
- STRESS5 (family conflict).

The *psychological* stress responses included irritability, time pressure, job dissatisfaction, thoughts of quitting job, depression, anxiety, and less leisure time. The pattern of results was less evident; however, three strong discriminating variables emerged in the following order of importance:

- STRESS3 (social support);
- STRESS5 (family conflict); and
- STRESS2 (growth opportunities).

Only two stress sources figured prominantly in the differentiation between groups of nurses experiencing or not experiencing the *physical* responses of fatigue and more somatic complaints. They are presented in their order of influence:

- STRESS3 (social support); and
- STRESS4 (personal economic security).

These finding show that STRESS2 was the only work stressor to have a major discriminating influence, and that was for only one category of stress response, the psychological.

Stress arising at home or socially was found to be most predictive of nurses' stress manifestations.

In summary, the results of fourteen discriminant analyses were presented and discussed. Major discriminating variables were identified for each stress manifestation, although the high value of the final Wilks' lambda in each analysis indicated that the discriminating power of the fourteen combinations of independent variables was limited. STRESS3, STRESS4, and STRESS5 were most predictive of whether or not a particular stress manifestation was experienced. Furthermore, occupational stressors were found to be relatively unimportant in differentiating between the groups.

4.8 Summary

The results of the survey, the analysis of nurses' major environmental stressors, and the variables associated with their stress score variability were presented and discussed. Furthermore, the results of the multivariate analyses pertaining to two facets of their stress were presented and discussed. A summary of the major findings from these analyses is presented in the following chapter.

5. SUMMARY AND RECOMMENDATIONS

In this final chapter, a summary of the study is presented, major findings and conclusions are delineated, and several recommendations are made.

5.1 Summary of the Study

Recent widespread nursing manpower shortages and high rates of job turnover and absenteeism indicated that a serious nursing manpower problem existed in Alberta and elsewhere. The AHA (1980) study suggested that the nursing occupation's manpower problems could be explained in part by nurses' job stressors and their socio-demographic characteristics. This study derived its impetus from these problems, and was undertaken in order to empirically identify and compare Alberta nurses' sources and levels of stress. Emphasis was placed on the identification of environmental stressors amenable to management manipulation, and on stress responses affecting work performance so as to determine areas of nursing manpower management practice requiring modification and evaluation.

A review of pertinent literature revealed that stress is poorly understood. Consequently, its measurement was hindered and meaningful comparisons and generalizations of study findings were restricted. Most nursing stress investigations focussed on the identification of hospital nurses' work stressors, without regard for other stress sources, or for the stress experienced by nonhospital nurses. Furthermore, few studies attempted to compare the sources and levels of stress experienced by nurses employed in various settings. The study objectives were formulated so as to address these gaps.

Following the literature review, it was evident that the inadequate formulation of the stress concept necessitated a descriptive, exploratory approach to the study of Alberta nurses' stress. Consequently, the decision was made to survey them by questionnaire in order to obtain a large cross-section of nurses. Feasibility issues and the scope of the study required that the survey be restricted to two nursing employment sectors, the acute care hospital and the public health setting. The target population was further limited to include only the nurses employed at two urban hospitals and one urban public health agency. Furthermore, the selection criteria for the target population required that all nurses be minimally prepared at the diploma level, had retained their present fulltime position for at least six months, and were hired into staff positions.

Several published stress measurement instruments were located in the literature but, as none were entirely appropriate to this study's design, they were modified for use in the study. Variables pertaining to potential work, home, and social environmental stressors were incorporated into the revised questionnaire, in addition to relevant stress manifestations and socio-demographic characteristics of nurses. As the questionnaire represented a modification of existing instruments, its reliability and validity were unknown. Preliminary forms of both parameters were assessed. Acceptable levels of questionnaire validity were established during a pretest, and the questionnaire was subsequently distributed to approximately 360 hospital nurses, employed in either Edmonton or Calgary, and to approximately 110 Calgary public health nurses.

Almost 370 questionnaires were returned, representing an overall response rate of 79 per cent. On the basis of the survey questionnaire responses, the respondents' characteristics were observed and eight major sources of their environmental stress were identified. Their major stressors arose from the work, home and social environments as postulated *a priori*. These eight stressors formed the basis of a Nursing Stress Scale, comprised of only the questionnaire items most associated with each stress source. Respondents' scores on each of these eight stress subscales were used in subsequent analyses in order to determine the employment and socio-demographic characteristics associated with various sources and levels of the nurses' stress, and to examine the relationship between their stress levels and stress manifestations affecting their work performance.

Pertinent findings from the study are presented in the following section.

5.2 Major Findings

The major findings evident following the literature review and the data analyses are listed below.

1. As stress is poorly understood and inadequately defined, most studies involved descriptive, cross-sectional surveys of subjects' stress sources and manifestations. Consequently, the empirical evidence pertaining to stress was largely correlational and the issue of causality could not be addressed.
2. Most stress studies, including nursing investigations, attempted to identify occupational stressors, and excluded the home and social environments as potential other sources of stress.
3. Hospital nurses, and particularly specialty care nurses, were the subjects of most nursing stress studies. Public health nurses' stress was rarely investigated, suggesting that they experienced less stress than hospital nurses.
4. The following nursing stressors were reported in the literature reviewed:
    a. task-based, particularly related to meeting patient/client care needs and excessive workloads;
    b. role-based, especially when the values held by the nurse conflicted with organizational and physician expectations;
    c. lack of role-fulfillment, especially if the nurse felt that an unacceptable standard of patient/client

care was delivered, or satisfactory patient outcomes were not attained; and

d. nonparticipation in decisions affecting patient/client care.

5. Acceptable levels of questionnaire face and content validity were established during a pretest; limited indications of its construct validity were evident following the comparison of the postulated and empirically derived stress sources.

6. Factor analysis of the questionnaire responses led to the identification of the following eight major stress sources:

   - STRESS1: Work Tasks and Roles
   - STRESS2: Personal/Professional Growth Opportunities
   - STRESS3: Level of Social Support
   - STRESS4: Personal Economic Security
   - STRESS5: Family Conflicts
   - STRESS6: Level of Job Satisfaction
   - STRESS7: Performance Appraisal
   - STRESS8: Adequacy of Physical Working Conditions

7. The reliability of the variables most associated with each stress source were assessed. The internal consistency of the items comprising the first five scales was acceptable, the reliability coefficients for the latter three stress scales were quite low.

8. A Nursing Stress Scale, comprised of the variables associated with each of the eight subscales, was found to adequately represent most stressors satisfactorily and to a lesser extent, STRESS6 and STRESS7.

9. Multiple regression analyses of the stress subscales indicated that:

a. Hospital employment generally was associated with higher stress of the following type: STRESS1, STRESS2, STRESS5, and STRESS8; and lower stress on STRESS6 and STRESS7. Conversely, community health nursing was associated with high STRESS6 and STRESS7 and lower stress from the other identified sources.

b. Three acute care nursing specialities, that is ICU, paediatrics and surgery, were associated with higher stress scores on most scales, and obstetrical/gynecological nursing was associated with the lowest stress scores except for STRESS2 and STRESS5.

c. The more nursing experience one had, the lower were the expected stress scores for all stress sources.

d. More education raised all stress scores except STRESS4 and had no effect on the STRESS3 scores.

e. Older nurses had higher stress scores except for STRESS6, which were lower.

f. Being married was associated with lower stress scores in all areas except STRESS5, which was higher.

g. Having more dependents was associated with higher stress presumably due to home and social concerns, and lower stress scores for work stressors.

h. Only a small amount of the variation in the respondents' stress scores was explained by the employment and socio-demographic variables, thus indicating a need to identify other relevant variables.

10. Discriminant analyses of the stress manifestations indicated that:
    a. Stressors originating at home or socially were most influential in explaining the presence or absence of a particular stress manifestation.
    b. The behavioral stress manifestations were most associated with STRESS4, STRESS3, and STRESS5; the psychological responses were most associated with STRESS3, STRESS5, and STRESS2; and the physiological stress manifestations were most associated with STRESS3 and STRESS4.
    c. Only minimal separation between groups of nurses experiencing or not experiencing a particular stress manifestation was possible with the combination of stress subscales used. This indicated a need to identify other relevant variables.

5.3 Conclusions

The major conclusions that were evident following the data analysis are discussed below.

1. The inadequate formulation of the stress concept meant that a descriptive and exploratory survey of Alberta nurses' stress was appropriate. Furthermore, as most nursing stress studies had investigated the stress of only hospital nurses, a comparative study of hospital and public health nurses' stress would contribute

information about nurses' stress generally.

2. The selected conceptual model of nurses' stress indicated the need to incorporate not only potential work stressors, but also potential home and social stressors. Furthermore, following the literature review, it was evident that nurses' socio-demographic characteristics were associated with their stress perceptions and manifestations.
3. Acceptable levels of questionnaire face and content validity were established by a questionnaire pretest. Subsequent to the stress factor identification, reliability assessments of pertinent questionnaire variables indicated that the items comprising the first five stress scales provided dependable measurements of nurses' stress. Three scales, that is STRESS6, STRESS7, and STRESS8, provided less reliable measurements and consequently, responses to the variables comprising these scales should be reexamined. Furthermore, comparison of the nurses' empirically derived stressors with the hypothesized constructs confirmed the evidence to suggest that the eight stress scales provided reasonably accurate measurements of nurses' stress sources.
4. Considering the above points, the data analysis indicated that nurses' major sources of environmental stress are represented best by the following:
   - the nature of their work tasks and roles;

- the adequacy of their personal and professional growth opportunities;
- their level of social support;
- their personal economic security; and
- family conflicts.

5. The analysis of variables associated with nurses' stress confirmed the expected finding that hospital employment generally, and ICU, paediatric, and surgical nursing specifically, would raise the nurses' stress levels due to the previously identified sources. Conversely, it was surprising that community health nurses would experience more stress due to their level of job dissatisfaction. However, as additional education was found to elevate the stress levels for most stressors, and the majority of community health nurses were better educated than the subsample of hospital nurses, this finding seemed reasonable.
6. As expected, all the socio-demographic variables were found to have an effect on the nurses' perceived stress levels. Only long years of experience and being married were associated with lower perceived stress levels. However, the modest degree to which the employment and socio-demographic variables could be used to explain differences in nurses' stress levels raised several points. First, other, perhaps more important variables, such as coping abilities, may have been associated with their stress levels. Secondly, the identified predictor

variables may not have been adequately measured and therefore could not adequately explain nurses' stress level variation. To illustrate, the broad grouping of age categories may have been insufficient to account for variation due to age differences. Finally, other measurement errors and random fluctuations in nurses' stress levels may have resulted in untrue variation in their stress scores.

7. The negligible degree to which nurses' stress scores were related to their stress manifestations suggested the need to identify other variables to explain their responses, the need to determine more acceptable measurements of their stress manifestations, and/or the need to develop further the theory.

5.4 Recommendations

Following completion of this study, four recommendations were made. It is recommended that:

1. The Nursing Stress Scale, comprised of the eight subscales, be used by nursing administrators to:
   a. identify individual nurses' or groups of nurses' sources and levels of stress, and
   b. assess the effectiveness of management interventions designed to reduce nurses' stress.
2. The recruitment and selection of nurses for known high stress work areas be modified to facilitate the employment of moderately experienced but younger nurses who

are married with no dependents.

3. Nursing managers modify their management practices to encourage more staff nurse participation in decisions affecting patient care and their working conditions, especially as nurses are being encouraged to upgrade their education, and this is associated with altered values and job expectations that contribute to nurses' work stress.
4. Further research be conducted to:
    a. assess the construct validity of the Nursing Stress Scale,
    b. identify other variables associated with nurses' perceived stress and their stress manifestations, and
    c. test the applicability of the Nursing Stress Scale in other nursing employment settings.

Information provided by this further research would assist in the formulation of a conceptual model of nurses' stress, as well as contribute towards the development of a nursing stress index that would permit comparisons between nurses or nurses' work settings.

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APPENDIX A: Draft Questionnaire

SOURCES, LEVELS AND POSSIBLE OUTCOMES OF STRESS

Based on your experience in a ***typical*** *work week, indicate for each of the following statements whether or not it is a source of stress and if so, how much stress you experience.*

	No stress	Yes little	Yes moderate	Yes great
1. The appropriateness of your workload.	1	2	3	4
2. The degree to which you have opportunities to work a compressed work week.	1	2	3	4
3. The degree to which you have opportunities for continuing education.	1	2	3	4
4. The degree of feedback about your work performance.	1	2	3	4
5. The adequacy of your interpersonal relationships with co-workers.	1	2	3	4
6. The degree to which you have opportunities for career advancement.	1	2	3	4
7. Your degree of involvement in decisions affecting your work.	1	2	3	4
8. Your degree of satisfaction with your rate of pay.	1	2	3	4
9. Your co-workers' degree of clinical competence.	1	2	3	4
10. Your appropriateness of preparation or training for your job.	1	2	3	4
11. The degree of variety in your work tasks.	1	2	3	4
12. The degree to which your job responsibilities are defined.	1	2	3	4
13. The adequacy of your interactions with physicians.	1	2	3	4

	No stress	Yes little	Yes moderate	Yes great
14. The availability of resource persons to assist you in problem-solving.	1	2	3	4
15. The degree to which you experience accomplishment in your work.	1	2	3	4
16. Your degree of job security.	1	2	3	4
17. Your degree of access to information which keeps you up to date on events at work.	1	2	3	4
18. Your degree of job status or prestige.	1	2	3	4
19. Your supervisor's degree of interest in you as a person.	1	2	3	4
20. Your degree of opportunities to utilize your skills and knowledge.	1	2	3	4
21. Your responsibility for seriously ill or dying patients/clients.	1	2	3	4
22. The degree to which you are required to work changing work schedules.	1	2	3	4
23. The degree to which you are required to float to a nursing unit/agency.	1	2	3	4
24. The degree of opportunities for intellectual stimulation in your job.	1	2	3	4
25. The adequacy of your working relationship with your supervisor.	1	2	3	4
26. The degree of opportunity to practice nursing at the level of your professional standard.	1	2	3	4

Because aspects of one's home situation or personal life may create sources of stress that can impact on work, would you indicate if any of these are a source of stress and similarly how much stress you experience.

	No stress	Yes little	Yes moderate	Yes great
1. The degree of available time to spend with family or significant others.	1	2	3	4
2. The degree of dual responsibilities for home and job.	1	2	3	4
3. Your number of opportunities to discuss personal concerns or feelings with a friend or friends.	1	2	3	4

	No stress	Yes little	Yes moderate	Yes great
4. Your degree of support received from your family or significant others.	1	2	3	4
5. Your degree of financial security.	1	2	3	4
6. Your state of health or that of family members.	1	2	3	4

PLEASE PROCEED TO BACK PAGE.

Please check (✓) the appropriate space(s).

1. In the past six months, how many separate occasions of sick leave did you take?

____ 0 occasions
____ 1 - 2 occasions
____ 3 - 5 occasions
____ More than 5 occasions

If you had no sick leave in the past six months, skip to question 3.

2. What were the reasons for this sick leave? (check more than one if applicable)

____ Physical ailment
____ Mental health day
____ Fatigue
____ Family responsibility
____ Job pressure
____ Transportation difficulties
____ Other (please specify) ________________________

____

3. How many times in the past five years did you resign from your job and take temporary time off (i.e. three months or less) because a factor in your decision was:

a. too much stress in your work?
____ 0 times
____ 1 time
____ 2 times
____ 3 times
____ 4 times or more

b. too little stress in your work?
____ 0 times
____ 1 time
____ 2 times
____ 3 times
____ 4 times or more

4. How many times in the past five years did you resign from your job and take extended time off (i.e. more than three months) because a factor in your decision was:

a. too much stress in your work?
____ 0 times
____ 1 time
____ 2 times
____ 3 times
____ 4 times or more

b. too little stress in your work?
____ 0 times
____ 1 time
____ 2 times
____ 3 times
____ 4 times or more

5. How many times in the past five years did you leave one job to begin another because a factor in your decision was:

a. too much stress in your work?
____ 0 times
____ 1 time
____ 2 times
____ 3 times
____ 4 times or more

b. too little stress in your work?
____ 0 times
____ 1 time
____ 2 times
____ 3 times
____ 4 times or more

If you work in the community setting, omit the following question. If you work in the acute care setting, the following question is optional.

6. Sources and levels of stress are known to vary across clinical specialty areas. To help differentiate between areas, please specify in which clinical specialty area you presently work.

____

BIOGRAPHIC DATA

Please check (✓) the appropriate space(s).

1. How many years of nursing experience, including both part-time and full-time, do you have?

____ Years

2. Which Diplomas, Degrees, or Certificates do you have?

____ RN Diploma
____ RPN Diploma
____ Nurse Midwifery Certificate
____ Clinical Post Graduate Certificate
____ Public Health/Occupational Health Diploma
____ Bachelor's Degree
____ Master's Degree

3. What is your appropriate age category?

____ 20 - 29
____ 30 - 39
____ 40 - 49
____ 50 - 59
____ 60 -

4. What is your marital status?

____ Single (never married)
____ Married (including common-law)
____ Separated or Divorced
____ Widowed

5. How many children or other people for whom you are responsible live in your home?

____ 0
____ 1
____ 2
____ 3
____ 4 or more

THANK YOU FOR YOUR COOPERATION. PLEASE ENCLOSE IN THE ACCOMPANYING ENVELOPE AND MAIL.

APPENDIX B: Correspondence Used in Questionnaire Pretest

B.1 Letter Sent to Content Experts

B.2 Letter Sent to Pretest Respndents

FACULTY OF MEDICINE
THE UNIVERSITY OF ALBERTA

DEPARTMENT OF HEALTH SERVICES ADMINISTRATION AND COMMUNITY MEDICINE

13-103 Clinical Sciences Building
EDMONTON, ALBERTA, CANADA
T6G 2G3

Telephone (403) 432-6407

March 10, 1983.

Dear

Thank you for your willingness to assist me by evaluating the content of the enclosed questionnaire. As we discussed over the telephone, the questionnaire is designed to measure perceived sources, levels, and possible outcomes of stress in nurses' work and non-work environments. The proposed respondents are full-time employees in two settings - the tertiary care hospital (Foothills Hospital and University of Alberta Hospitals) and the urban community health agency (Calgary Health Services and Edmonton Local Board of Health).

As you have expertise in the areas of stress and nursing, your evaluation of the accuracy and comprehensiveness of the questionnaire content would be highly respected. I would ask that you first judge whether or not each item identifies a stressor in the nursing work and non-work environments. For your convenience, please circle on the attached sheet any item number which you think is an inappropriate stressor. If you feel the stressor is appropriate to the construct but the question is worded inappropriately, your suggestions for improvement would be appreciated. After having examined each item, please indicate in the space provided, your judgment of whether or not the entire questionnaire has tapped all the germane areas of the stress items which might have been included. It is my intention to maintain the questionnaire length but the content is of course subject to modification based on your evaluation.

...2

After people such as yourself have judged the questionnaire and I have determined that nurses can complete it, I will be pleased to provide you with a copy of the final product.

I sincerely appreciate your time and effort in assisting me in this way. Thank you very much.

Yours truly,

Beverley J. Moir
Candidate, M.H.S.A.

encl.
attachment

Content Evaluation: Sources, Levels and Possible Outcomes of Stress

Work Environment

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Social/Home Environment

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5

6

cont'd.

Possible Effects

1 3

2 4

Biographic Data

1 4

2 5

3

Comprehensiveness of Entire Questionnaire

FACULTY OF MEDICINE
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DEPARTMENT OF HEALTH SERVICES ADMINISTRATION AND COMMUNITY MEDICINE

13-103 Clinical Sciences Building
EDMONTON, ALBERTA, CANADA
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May 12, 1983.

Dear Fellow Nurse:

Thank you for agreeing to help me by participating in a pilot test of the questionnaire. After it has been tested, the questionnaire will be used in conducting research for my thesis requirements for the Masters Degree in Health Services Administration.

The purpose of the research is to identify sources of stress in nurses' work and non-work environments. Stress, as defined for the study, is the feeling of pressure or arousal experienced by a person as a result of situations in the environment which require adjustment. Hospital- and community-based nurses, selected for participation in the study, are asked to indicate on the questionnaire the sources of stress arising in their work and/or home settings and the levels of stress associated with any stressful items. Also included are questions to determine possible effects of stress.

You can assist me by completing the questionnaire and then providing your feedback on the attached sheet. Any other comments you would like to make would be appreciated. Your feedback will be used to modify the questionnaire where indicated in order to ensure its acceptability for distribution to your nursing colleagues at the end of May.

Your responses will be treated confidentially and anonymously. Please enclose the completed questionnaire and your evaluation in the accompanying envelope and return it to me through inter-campus mail.

Thank you for your cooperation in completing the questionnaire and providing me with your evaluation of it.

Yours truly,

Beverley Moir R.N., BScN.

encl.

Questionnaire Evaluation

1. How long did it take you to complete the questionnaire?
   ________ minutes

2. Did you feel the length of time it took to complete the questionnaire was:
   _____ too long or _____ too short or _____ about right?

3. Please circle any questionnaire item number where the meaning of the question was not clear. Your comments as to what was not understood would be appreciated.

4. Please underline any questionnaire item which in your judgment seems inappropriate or unreasonable to your particular work setting or personal situation.

5. If there are other aspects of a nurse's job or personal situation which create stress and which you think should be included, please list them here. Feel free to make additional comments.

APPENDIX C: Revised Questionnaire Used in Survey

SOURCES, LEVELS AND POSSIBLE EFFECTS OF STRESS

BASED ON YOUR EXPERIENCE IN A TYPICAL WORK WEEK, INDICATE FOR EACH OF THE FOLLOWING STATEMENTS WHETHER OR NOT IT IS A SOURCE OF STRESS AND IF SO, HOW MUCH STRESS YOU EXPERIENCE.

	No stress	Yes little	Yes moderate	Yes great
1. The amount of work you are required to do.	1	2	3	4
2. The adequacy of your work space.	1	2	3	4
3. The number of people with whom you must interact.	1	2	3	4
4. The amount of feedback about your work performance.	1	2	3	4
5. The adequacy of your interpersonal relationships with co-workers.	1	2	3	4
6. The degree to which you have opportunities for career advancement.	1	2	3	4
7. The degree of your involvement in decisions affecting your work.	1	2	3	4
8. The degree of your satisfaction with your rate of pay.	1	2	3	4
9. The adequacy of your interactions with patients/clients or their families.	1	2	3	4
10. The appropriateness of your preparation or training for the demands of your job.	1	2	3	4
11. The degree of variety in your work tasks.	1	2	3	4
12. The degree to which you are required to adopt or adapt to new equipment, methods or techniques.	1	2	3	4
13. The adequacy of your interactions with physicians.	1	2	3	4
14. The availability of resource persons to assist you in problem-solving.	1	2	3	4
15. The degree to which you feel accomplishment in your work.	1	2	3	4
16. The degree of your job security.	1	2	3	4
17. The degree of your access to information which keeps you up to date on events at work.	1	2	3	4
18. The degree of your job status or prestige.	1	2	3	4
19. The level of noise you experience.	1	2	3	4
20. The amount of time spent in work-related travel.	1	2	3	4
21. The level to which your job responsibilities are defined.	1	2	3	4
22. The degree to which you are required to work changing work schedules.	1	2	3	4
23. The degree to which you are required to care for patients/clients with difficult behaviors, personalities, or conditions.	1	2	3	4
24. The number of opportunities for intellectual stimulation in your job.	1	2	3	4
25. The adequacy of your interpersonal relationship with your supervisor.	1	2	3	4
26. The degree of opportunity to practice nursing at the level of your professional standard.	1	2	3	4

BECAUSE ASPECTS OF ONE'S HOME SITUATION OR PERSONAL LIFE MAY CREATE SOURCES OF STRESS THAT CAN IMPACT ON WORK WOULD YOU INDICATE IF ANY OF THESE ARE A SOURCE OF STRESS FOR YOU AND SIMILARLY HOW MUCH STRESS YOU EXPERIENCE.

	No stress	Yes little	Yes moderate	Yes great
1. The amount of time available to spend with family or significant others.	1	2	3	4
2. The amount of responsibility for home and job.	1	2	3	4
3. The number of opportunities to discuss personal concerns or feelings with relatives or friends.	1	2	3	4
4. The degree of support you are receiving from your family or significant others.	1	2	3	4
5. The level of your financial security.	1	2	3	4
6. The state of your health and/or your family members' health.	1	2	3	4

PLEASE PROCEED TO REVERSE SIDE

PLEASE CHECK (✓) THE APPROPRIATE SPACE(S).

1. During the past six months, how many separate episodes of absenteeism, due to sickness or other personal reasons, did you experience?

____ 0 occasions

____ 1 - 2 occasions

____ 3 - 5 occasions

____ More than 5 occasions

If you had no absenteeism during the past six months, skip to question 3.

2. What were the reasons for the absences? (check more than one if applicable)

____ Physical ailment(s)

____ Mental health day

____ Fatigue

____ Family responsibility

____ Job pressure

____ Transportation difficulties

____ Other (please specify)

____

3. Please indicate if you have experienced or observed in yourself any of the following states or behaviors in the past three months or less. (check more than one if applicable)

____ increased feelings of fatigue

____ irritability or emotional outbursts

____ feelings of time pressure

____ increased consumption of coffee or tea

____ feeling of job dissatisfaction

____ forgetfulness

____ insomnia

____ thoughts of leaving your job

____ increased consumption of alcohol or drugs

____ more aches, pains or flus than usual

____ increased use of cigarettes

____ depression

____ anxiety

____ less time available for leisure or hobbies

4. Sources and levels of stress are known to vary across clinical speciality areas. To help differentiate between areas, please specify in which area you work:

____ Community Health

____ ICU

____ Medicine

____ Obstetrics. Gynecology

____ Paediatrics

____ Psychiatry

____ Surgery

____ Other (please specify)

____

BIOGRAPHIC DATA

PLEASE CHECK (✓) THE APPROPRIATE SPACE(S).

1. How many years of nursing experience, either part-time or full-time, do you have?

☐☐ Years Full-time ☐☐ Years Part-time

2. What level of education have you completed? (check more than one if applicable)

____ RN Diploma

____ RPN Diploma

____ Nurse Midwifery Certificate

____ Clinical Post Graduate Certificate

____ Public Health Occupational Health Diploma

____ Bachelors Degree

____ Masters Degree

____ Other (please specify)

____

3. What is your age category?

____ 20 - 29

____ 30 - 39

____ 40 - 49

____ 50 - 59

____ 60 -

4. What is your marital status?

____ Single (never married)

____ Married (including common-law)

____ Separated or Divorced

____ Widowed

5. How many dependent children or other people, for whom you are responsible, live in your home?

____ 0

____ 1

____ 2

____ 3

____ 4 or more

THANK YOU FOR YOUR COOPERATION IN COMPLETING THIS QUESTIONNAIRE.
PLEASE ENCLOSE IN THE ACCOMPANYING ENVELOPE AND MAIL.

APPENDIX D: Correspondence Used in Survey

D.1 Covering Letter Sent to Nurses at University Hospitals

D.2 Covering Letter Sent to Other Nurses

D.3 Followup Letter Sent to University Hospitals' Nurses

D.4 Followup Letter Sent to Foothills Hospital's Nurses

FACULTY OF MEDICINE
THE UNIVERSITY OF ALBERTA

DEPARTMENT OF HEALTH SERVICES ADMINISTRATION AND COMMUNITY MEDICINE

13-103 Clinical Sciences Building
EDMONTON, ALBERTA, CANADA
T6G 2G3
Telephone (403) 432-6407

May 27, 1983.

Dear Fellow Nurse:

You have been selected to participate in a study designed to identify sources of stress in nurses' work and non-work environments. The study is being conducted as part of the requirements for a Masters Degree in Health Services Administration under the supervision of Dr. Kyung Bay, Professor, Department of Health Services Administration and Community Medicine.

Stress, as defined for the study, is the feeling of pressure or arousal experienced by a person as a result of situations in the environment which require adjustment. Hospital- and community-based nurses, selected for participation in the study, are asked to indicate on the questionnaire the sources of stress arising in their work and/or home settings and the levels of stress associated with any stressful items. Possible effects of stress are also included for investigation. Your response is needed to ensure sufficient information to allow comparisons between these groups of nurses.

Your voluntary cooperation is greatly appreciated. All responses will be treated confidentially and anonymously. The questionnaire will take approximately 20 minutes of your time and, after you have completed it, return it to me in the enclosed, postage-paid return envelope. Complete the enclosed response card and send it separately to Nursing Office. It will be used to ensure that you are not troubled by followup procedures. A summary of the study findings will be made available to you when they are available in the fall.

Thank you for your cooperation in completing the enclosed questionnaire.

Yours sincerely,

Beverley Moir R.N., BScN.

NURSES' PERCEPTIONS OF ENVIRONMENTAL STRESS

Please complete this response card and return it to NURSING OFFICE indicating that the questionnaire has been completed and returned.

NAME: ______________________________

This information will ensure that you do not receive a followup letter.

FACULTY OF MEDICINE
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May 27, 1983.

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Your voluntary cooperation is greatly appreciated. All responses will be treated confidentially and anonymously. The questionnaire will take approximately 20 minutes of your time and, after you have completed it, return it to me in the enclosed, postage-paid return envelope. A summary of the study findings will be made available to you when they are available in the fall.

Thank you for your cooperation in completing the enclosed questionnaire.

Yours sincerely,

Beverley Mair

Beverley Mair R.N., BScN.

FACULTY OF MEDICINE
THE UNIVERSITY OF ALBERTA

DEPARTMENT OF HEALTH SERVICES ADMINISTRATION AND COMMUNITY MEDICINE

13-103 Clinical Sciences Building
EDMONTON, ALBERTA, CANADA
T6G 2G3
Telephone (403) 432-6407

June 29, 1983.

Dear Fellow Nurse:

From the response cards returned thus far, I note that you have not yet responded to the questionnaire designed to identify Nurses' Sources, Levels and Possible Effects of Stress.

The information which you provide would be of great value in helping to identify nurses' environmental stressors and would allow comparisons to be made between nurses working in different settings. Your input will enable me to incorporate your views in the analysis. Please take time to fill out and return the questionnaire.

In case you have misplaced the first questionnaire, another one has been enclosed for your use. Please disregard this letter if you have returned the questionnaire. I appreciate your participation in the study.

Yours sincerely,

Beverley Moir R.N., BScN

encl.

FACULTY OF MEDICINE
THE UNIVERSITY OF ALBERTA

DEPARTMENT OF HEALTH SERVICES ADMINISTRATION AND COMMUNITY MEDICINE

13-103 Clinical Sciences Building
EDMONTON, ALBERTA, CANADA
T6G 2G3

Telephone (403) 432-6407

July 6, 1983.

Dear Fellow Nurse:

My files indicate that many nurses have not yet responded to the questionnaire seeking to identify nurses' Sources, Levels and Possible Effects of Environmental Stress.

The information which you provide would be of great value in helping to identify nurses' environmental stressors and would allow comparisons to be made between nurses working in different settings. Your input will enable me to incorporate your views in the analysis. Please take time to fill out and return the questionnaire.

In case you have misplaced the first questionnaire, another one is available from Mrs. N. Thurston, Local 1441. Please disregard this letter if you have returned the questionnaire. I appreciate your participation in the study.

Yours sincerely,

Beverley Moir

Beverley Moir R.N., BScN

APPENDIX E: The Nursing Stress Scale

THE NURSING STRESS SCALE

Instructions for Respondents

Based on your experience in a *typical* work week, indicate for each of the following statements whether or not it is a source of stress and if so, how much stress you experience.

In using this scale, stress is defined as a feeling or state of pressure or arousal experienced by a person as a result of an environmental situation or demand that requires adjustment.

SUBSCALEI: The Nature of Work Tasks and Roles

	No stress	Yes little	Yes moderate	Yes great
1. The amount of work you are required to do.	0	1	2	3
2. The number of people with whom you must interact.	0	1	2	3
3. The adequacy of your interactions with patients/clients or their families.	0	1	2	3
4. The appropriateness of your preparation or training for the demands of your job.	0	1	2	3
5. The degree of variety in your work tasks.	0	1	2	3
6. The degree to which you are required to adopt or adapt to new equipment, methods or techniques.	0	1	2	3
7. The adequacy of your interactions with physicians.	0	1	2	3
8. The level to which your job responsibilities are defined.	0	1	2	3
9. The degree to which you are required to care for patients/clients with difficult behaviors, personalities, or conditions.	0	1	2	3

SUBSCALE2: Opportunities for Personal and Professional Growth

	No stress	Yes little	Yes moderate	Yes great
1. The degree to which you have opportunities for career advancement.	0	1	2	3
2. The degree to which you feel accomplishment in your work.	0	1	2	3
3. The degree of your access to information which keeps you up to date on events at work.	0	1	2	3
4. The degree of your job status or prestige.	0	1	2	3
5. The number of opportunities for intellectual stimulation in your job.	0	1	2	3
6. The adequacy of your interpersonal relationship with your supervisor.	0	1	2	3
7. The degree of opportunity to practice nursing at the level of your professional standard.	0	1	2	3

SUBSCALE3: Opportunities for Social Support

1. The degree of support you are receiving from your family or significant others.	0	1	2	3
2. The number of opportunities to discuss personal concerns or feelings with relatives or friends.	0	1	2	3

SUBSCALE4: Degree of Personal Economic Security

1. The degree of your job security.	0	1	2	3
2. The level of your financial security.	0	1	2	3
3. The state of your health and/or your family members' health.	0	1	2	3

	No stress	Yes little	Yes moderate	Yes great
SUBSCALE5: Amount of Family Conflict				
1. The amount of time available to spend with family or significant others.	0	1	2	3
2. The amount of responsibility for home and job.	0	1	2	3
SUBSCALE6: Level of Job Satisfaction				
1. The degree of your involvement in decisions affecting your work.	0	1	2	3
2. The degree of your satisfaction with your rate of pay.	0	1	2	3
SUBSCALE7: Amount of Performance Appraisal				
1. The amount of feedback about your work performance.	0	1	2	3
SUBSCALE8: Adequacy of Physical Working Conditions				
1. The adequacy of your work space.	0	1	2	3
2. The level of noise you experience.	0	1	2	3

Instructions for Scoring

1. Add the response values for each variable comprising the subscale in order to obtain the subscale score.
2. If an item was left blank, omit it from the subscale score.
3. If two responses were circled, use the higher value in the derivation of the subscale score.

SUBSCALE		SCORE
1	Work Tasks and Roles	____
2	Personal and Professional Growth Opportunities	____
3	Social Support Opportunities	____
4	Degree of Personal Economic Security	____
5	Amount of Family Conflict	____
6	Level of Job Satisfaction	____
7	Amount of Performance Appraisal	____
8	Adequacy of Physical Working Conditions	____